News and Views

in the Biological Sciences

THE AIBS BULLETIN

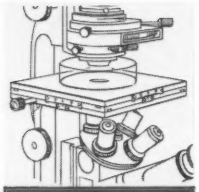
MAR 14 1961
INSTITUTE OF AGRI

PUBLISHED BY AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES *February, 1961*

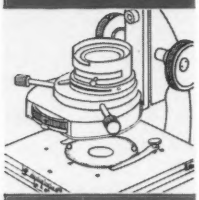
AGRICULTURE LIBRARY
UNIV. OF MINNESOTA
ST. PAUL 1, MINN.

In a PHASE-CAMERA-MICROSCOPE
Only UNITRON offers all three:

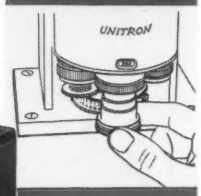
✓ **CONVENIENCE**
✓ **VERSATILITY**
✓ **ECONOMY**



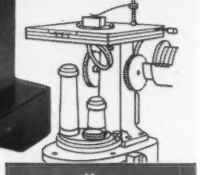
Graduated Mechanical Stage



Focusable Turret Condenser



Photographic Eyepiece Turret

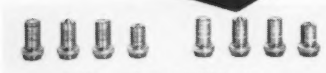


Macro Accessories

UNITRON'S unique Phase-Camera-Microscope will assure you a **CONVENIENCE** of operation impossible to duplicate with a conventional microscope stand. For example, a specimen consisting of a tissue culture or aqueous solution may be examined in the very petri dish in which it has been prepared. Merely place the dish on the microscope stage; examine the contents visually, project the image on the viewing screen, or photograph — all in rapid sequence and at magnifications up to 2000X. With the inverted design, there is no need to contend with slipping cover glasses or evaporating fluids. Using the phase optics, you dispense with messy chemical staining. Aided by the self-contained illumination system and built-in cameras, you eliminate troublesome problems of alignment and vibration.

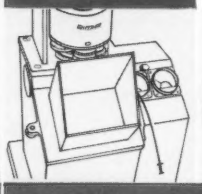
UNITRON'S Phase-Camera-Microscope, optically equipped for Bright and Dark Phase Contrast, bright and dark field, and polarized light, offers the microscopist a working tool of unmatched **VERSATILITY.** The overhead turret phase condenser is centerable, divisible, and provides long working distances sufficient even for micro-manipulation. Provision is included for four different cameras — 3¼" x 4¼", 35mm., Polaroid, and motion picture. Available at extra cost are macro accessories for magnifications as low as 5X and accessories for opaque specimens. This UNITRON model meets not only your urgent needs of today — its versatility is your assurance of continued usefulness in the future.

UNITRON'S Phase-Camera-Microscope is the ideal all-purpose instrument for visual examination, viewing, and photo-recording. Completely equipped with an impressive array of optics, its cost is actually lower than that of a conventional phase stand, camera and illuminator — true **ECONOMY** for any laboratory.

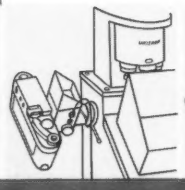


8 Phase Contrast Objectives

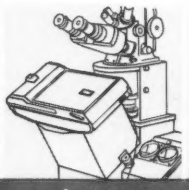
Visual Eyepieces | 4 Photographic Eyepieces, Filters.



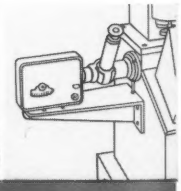
Standard 3¼" x 4¼" Camera



Accessory 35mm. Camera



Accessory 3¼" x 4¼" Polaroid Land Camera



Accessory Motion Picture Camera

UNITRON'S Phase-Camera-Microscope Model BU-13 as described including binocular body; 8 phase objectives 10X, 20X, 40X, 100X oil, in both bright and dark contrast; paired visual eyepieces R5X, P10X, Ke15X; focusing telescope; four photographic eyepieces 10X, 15X, 20X, Micrometer; phase condenser; filters; polarizing accessories; special glassware, etc.

$1580
FOB Boston

Monocular Model U-13 **$1390**

AVAILABLE ON FREE 10 DAY TRIAL

THE TREND IS TO UNITRON

UNITRON
INSTRUMENT COMPANY • MICROSCOPE SALES DIV.
66 NEEDHAM ST., NEWTON HIGHLANDS 61, MASS.

Please rush UNITRON's Microscope Catalog 60L

Name_____

Company_____

Address_____

City_____ State_____

Beautifully illustrated college texts from Saunders

Orr—VERTEBRATE BIOLOGY

New!—This handsomely illustrated text is designed for courses on vertebrate animals of North America. It ideally suits the needs of zoology majors, science teachers in training, and students of conservation and wildlife. Fishes, amphibians, reptiles, birds and mammals are each considered separately—their organ systems, general and special characteristics, distribution and population dynamics. Students will appreciate clearly written discussions on such topics as: modern systematics—general features of distribution—territorial concepts—methods of marking vertebrates—mechanics of migration—physiological factors associated with dormancy, such as temperature, metabolism, circulatory system—sex recognition, courtship and pair formation—etc.

By Robert T. Orr, Ph.D., Curator of Birds and Mammals, California Academy of Sciences; Professor of Biology, University of San Francisco. About 450 pages, 157 figures. *New—Ready April, 1961.*

Carpenter—MICROBIOLOGY

New—Designed for a one-semester college course in microbiology, this text clearly orients the student to the world of microorganisms. Outstanding diagrams, line drawings and photographs emphasize principles and general concepts. They graphically demonstrate chemical relationships and reactions. Logical organization of text material devotes equal coverage to discussions on the following:

A general survey of microorganisms

A detailed study of the biology of bacteria—their metabolism, growth, death and genetics

The ecologic relationships and role of microorganisms in natural or controlled environments

The interactions of pathogenic microorganisms with their animal or plant hosts

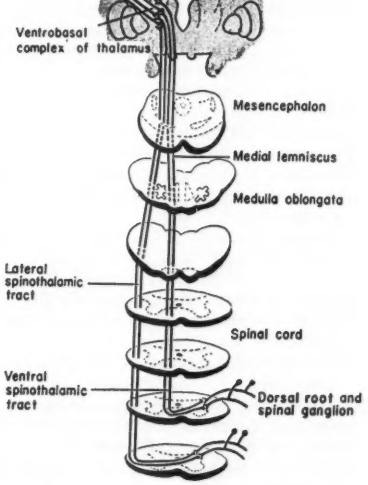
This text ideally fits the needs of students of home economics, agriculture, liberal arts and education who are taking a one-time course in microbiology. It also provides the necessary foundation for study—in the medical profession or in the various specialties such as pathogenic bacteriology or industrial microbiology.

By Philip L. Carpenter, Ph.D., Professor of Bacteriology, University of Rhode Island. About 480 pages, with 246 illustrations. *New—Ready in April, 1961.*

Guyton—Textbook of MEDICAL PHYSIOLOGY

New (2nd) Edition—Here is a remarkably clear study of the human body as a single functioning organism controlled by a myriad of regulatory systems. Tailored to students' capabilities, it stresses the automaticity of life processes. Principles of control theory are discussed as they apply to specific bodily mechanisms. Basic physical and chemical principles are stressed as well as biophysical aspects. A great deal of attention has been devoted to the interrelationships of functions of the different organ systems of the body. Comments on the original text by students and by physiologists have helped the author simplify and clarify the presentation of complicated physiological mechanisms. There is a new chapter on physiology of infants and three new chapters on endocrinology and physiology of reproduction. 500 of the more than 750 illustrations are either completely new or carefully revised.

By Arthur C. Guyton, M.D., Professor and Chairman of the Department of Physiology and Biophysics, University of Mississippi School of Medicine. 1181 pages, 7" x 10" with 774 illustrations. About $15.00. *New (2nd) Edition—Just Ready!*



Gladly sent to college teachers for consideration as texts

W. B. SAUNDERS COMPANY *West Washington Square, Philadelphia 5*

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

OFFICERS

TRACY M. SONNEBORN
President

BERNARD S. MEYER
Vice-President

F. P. CULLINAN
Secretary-Treasurer

HIDEN T. COX
Executive Director

MEMBER SOCIETIES — GOVERNING BOARD

American Academy of Microbiology	*Roger Reid*
American Bryological Society	*William C. Steere*
American Physiological Society	*Wallace O. Fenn*
American Phytopathological Society	*George L. McNew*
American Society for Horticultural Science	*Freeman S. Howlett*
American Society of Human Genetics	*Karl A. Stiles*
American Society of Ichthyologists & Herpetologists	*R. G. Zweifel*
American Society of Naturalists	*Albert P. Blair*
American Society of Parasitologists	*Arthur C. Walton*
American Society of Plant Physiologists	*B. S. Meyers*
American Society of Plant Taxonomists	*Reed C. Rollins*
American Society of Zoologists	*W. Gardner Lynn*
Botanical Society of America, Inc.	*Paul J. Kramer*
Conference of Biological Editors	*Fred R. Cagle*
Ecological Society of America	*David E. Davis*
Entomological Society of America	*F. W. Poos*
Genetics Society of America	*Carl P. Swanson*
Mycological Society of America	*John A. Stevenson*
National Association of Biology Teachers	*Dorothy Matala*
Phi Sigma Society	*Fred S. Orcutt*
Poultry Science Association	*A. M. Guhl*
Society for Industrial Microbiology	*E. L. Dulaney*
Society of General Physiologists	*Frits W. Went*
Society for the Study of Development and Growth	*Robert Briggs*

AFFILIATE SOCIETIES

American Association of Anatomists
American Association of Bioanalysts
American Electroencephalographic Society
American Fern Society, Inc.
American Fisheries Society
American Genetic Association
American Ornithologists' Union
American Society of Agronomy
American Society of Animal Production
American Society of Limnology and Oceanography, Inc.
American Society of Mammalogists
Association of Official Seed Analysts
Association of Southeastern Biologists
Biological Photographic Association
Federal Plant Quarantine Inspectors' National Association
International Association for Dental Research
National Pest Control Association
Society of American Bacteriologists
Society of American Foresters
Society for Experimental Biology and Medicine
Society of Protozoologists
Society for the Study of Evolution
Society of Systematic Zoology
Wildlife Disease Association

ASSOCIATES

The American Tobacco Company
Difco Laboratories
Falcon Plastics Company
Eugene Garfield Associates
General Biological Supply House
Hercules Powder Company
Hoffmann La Roche, Inc.
Holt, Rinehart and Winston, Inc.
Lilly Research Laboratories
Merck Sharp & Dohme
Monsanto Chemical Company
C. V. Mosby Company
Charles Pfizer & Company, Inc.
Professional Tape Company
Schering Corporation
Squibb Institute for Medical Research
The Norwich Pharmacal Company
Ivan Sorvall
Upjohn Company
Ward's Natural Science Establishment

MAJOR ACTIVITIES

Conferences and Meetings

JOHN R. OLIVE
Deputy Executive Director

Annual Meetings of Biological Societies
Advisory Committees
Conferences
Symposia
Consultants
Placement Service

Fiscal Services

MILDRED D. ERICKSON
Business Manager

Fiscal Management
Cooperative Accounting Services for Biological Societies
Subscriptions

Membership Activities

JOAN V. BATTERTON
Supervisor

Membership List Maintenance
National Register of Scientific and Technical Personnel

Biology News Bureau

HAROLD F. OSBORNE
Director

AIBS Newsletter
Information Services
Press Relations
Public Relations

Educational Activities

FRED A. HITCHCOCK
Acting Director

Biological Sciences Curriculum Study—Arnold Grobman, *Project Director*
Secondary School Biological Sciences Film Series—Robert S. Leisner, *Administrator*
Visiting Biologists Program
Career Information

Publications

FRANCIS C. HARWOOD
Director

Wildlife Disease
AIBS Bulletin
Quarterly Review of Biology
Translations of Soviet Biological Journals
Translations of Soviet Biological Monographs
Symposium Series
Cooperative Redactory Services for Biological Journals
Advertising Services

AIBS BULLETIN

PUBLISHED BY THE
AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES
2000 P STREET, NW, WASHINGTON 6, D. C.

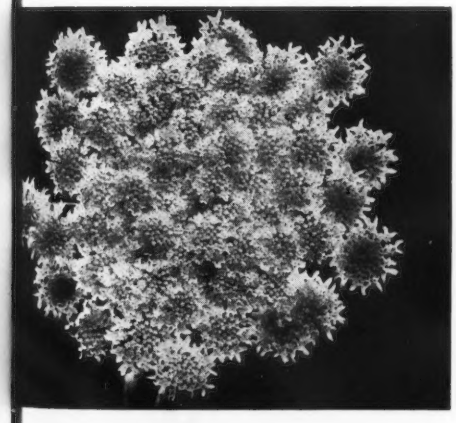
Editor-in-Chief ..... HIDEN T. COX

Editorial Board ..... RALPH E. CLELAND, LOUIS LEVIN

Director of Publications .. FRANCIS C. HARWOOD

Advertising Manager ..... TERRY HUNNER

February 1961 · Volume XI · Number 1



Cover Picture: Poison Doiley—this lace pattern shows how the flowerlets of the poison hemlock are botanically arranged. It presents a beauty and geometry that was probably lost on Socrates. Photograph by H. Lou Gibson, Rochester, N. Y.

How About a New Frontier in This Alley? ***11***
HIDEN T. COX

Biologists' reactions to some recent proposed Federal legislation regulating the use of animals in biological studies

An Evaluation of College Curricula for Industrial Orientation in Microbiology ***15***
COMMITTEE FOR EDUCATION
SOCIETY FOR INDUSTRIAL MICROBIOLOGY

A survey of the educational program and college faculty attitudes and recommendations

The Nature Conservancy Preserves ***17***
RICHARD H. GOODWIN

A description of new field facilities for teaching and research

Keynote Address ***21***
FAIRFIELD OSBORN

At the 7th General Assembly of the International Union for Conservation of Nature and Natural Resources

The Editor's Desk ***24***

AIBS Reports ***27***

Library ***28***

Index to Advertisers ***40***

The AIBS Bulletin is published 6 times a year in February, April, June, August (Program), October, and December. Copyright 1960 by tme American Institute of Biological Sciences, 2000 P Street, NW, Washington, D.C. Subscription prices: $3.00 a year (Single copy: $1.00) and to Affiliate Members $1.50 a year; Canada, South America & Central America, $3.50; all other foreign, $4.00.

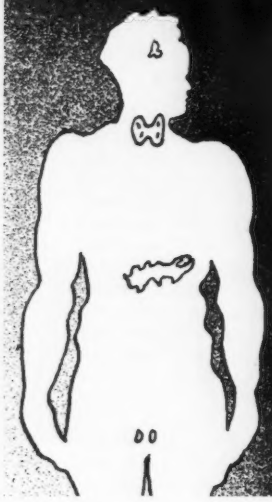
Address: American Institute of Biological Sciences, 2000 P. Street, NW, Washington, D.C. Second class postage paid at Washington, D.C. Printing and typography: Judd & Detweiler, Inc., Washington, D.C. Advertising rates and information mailed on request.

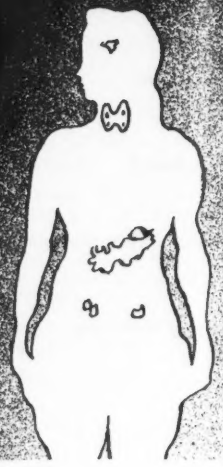
Principles of **ENDOCRINE ACTIVITY**

NEW SCIENCE FILM

16 minute, color or black and white

- Develops the concept of two coordinating mechanisms, nervous and chemical
- Introduces and defines "endocrine" and "Hormones"
- Locates and explains functions of seven important endocrine glands





Qualifies for purchase under Public Law 864 (National Defense Education Act)

AN INDIANA UNIVERSITY PRODUCTION

For rental, preview, or purchase information write to:

Audio-Visual Center
Indiana University
Bloomington, Indiana

DO YOU HAVE THIS CATALOG?

If you use Microslides and have not received your free copy, SEND FOR IT TODAY.

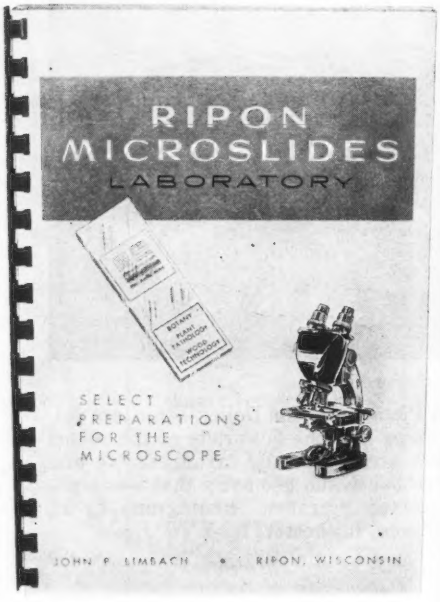
Over 1800 separate items are listed for classroom use in:

BOTANY

PLANT PATHOLOGY

WOOD TECHNOLOGY

Name .....
School .....
Position .....
Address .....
City ..... Zone ..... State .....



JOHN P. LIMBACH • BOX 164, ROUTE 2, RIPON, WISCONSIN • PHONE 958F41

BIOLOGY TEXTS
FROM MACMILLAN

**ELEMENTARY PHYSIOLOGY—
A LABORATORY GUIDE**

By OSCAR E. TAUBER, ROBERT E. HAUPT, and DELMA E. HARDING, all of Iowa State University of Science and Technology

1960, 190 pages, Ill., paper, $3.50

Here is a valuable companion to any basic textbook for courses in the physiology of the human body. The authors stress the functions of the various physiological systems, with ample text material on anatomical structure to make their functions clear. Other notable features: listings of all the necessary laboratory materials for each experiment and 95 original drawings, of which several are unlabeled for student completion.

FUNDAMENTALS OF PLANT PHYSIOLOGY

By JAMES F. FERRY, former Life Sciences Editor, McGraw-Hill Encyclopedia of Science and Technology, and HENRY S. WARD, Alabama Polytechnic Institute

1959, 288 pages, Ill., $6.50

An important textbook for the plant-science student who has had only elementary training in chemistry, this book provides detailed explanations of the fundamental principles of plant physiology and their applications to the behavioral problems of higher plants. Frequent references to significant research projects and lavish use of graphs aid in clarifying the text.

PRINCIPLES OF HORTICULTURE

By ERVIN L. DENISEN, Iowa State University of Science and Technology

1958, 509 pages, Ill., $7.25

This textbook introduces beginning students to the field of horticulture in a manner certain to attract and sustain their interest. In addition to a thorough grounding in the principles and techniques of horticulture, it offers a wealth of valuable information on cultivation around the home—lawns, trees, shrubs, flowers, fruits, and vegetables. An extensive glossary of terms and 350 excellent illustrations are included.

HUMAN PHYSIOLOGY

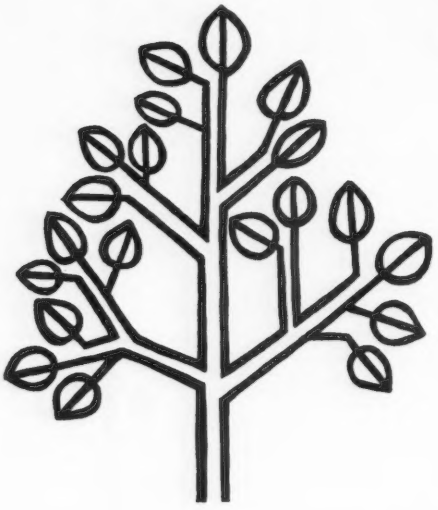
By W. B. YOUMANS, University of Wisconsin

1954, 481 pages, Ill., $6.00

This text offers full coverage of the physiology of the human body and includes the necessary biological and chemical principles for students with limited backgrounds in science. The physiology of muscle and nerve tissues, the characteristics of reflex action, and the physiology of the organic systems are discussed in full detail.

The Macmillan Company 60 Fifth Avenue, New York 11, N. Y.

foundations of MODERN BIOLOGY



published by prentice-hall, inc.

FOUNDATIONS OF MODERN BIOLOGY, a series of short, complete texts, each covering an integral area of biology, is an approach that introduces the student to biology as a growing, active science of principles and facts while permitting each instructor to determine the level and the structure of his own course. In presenting their subjects, the authors assume that the student has had no previous general biology courses. The volumes in this series are produced in an attractive, uniform format: *6 x 9 inches, 128 pages. Text edition, paperbound—$1.50 text list; Library edition, clothbound—$2.95 trade list.*

Series Editors: William D. McElroy and Carl P. Swanson

THE CELL (PUBLISHED 1960)
by Carl P. Swanson, The Johns Hopkins University
The place of the cell as the basic unit of biological structure and function.

ANIMAL GROWTH AND DEVELOPMENT (PUBLISHED 1960)
by Maurice Sussman, Brandeis University
A modern treatment of developmental phenomena, with emphasis upon the cellular level.

ANIMAL PHYSIOLOGY (PUBLISHED 1960)
by Knut Schmidt-Nielsen, Duke University
An elementary presentation of animal physiology, clearly discussing and defining the most important concepts.

THE PLANT KINGDOM (PUBLISHED 1960)
by Harold C. Bold, University of Texas
An introduction to the study of the range of types which comprise the plant world.

CELLULAR PHYSIOLOGY AND BIOCHEMISTRY (EARLY 1961)
by William D. McElroy, The Johns Hopkins University
A brief introduction to cellular physiology and biochemistry.

MAN IN NATURE (EARLY 1961)
by Marston Bates, University of Michigan
The biological aspects of human ecology—an attempt to put Man in biological perspective and provide a bridge between the biological and the social sciences.

ANIMAL DIVERSITY (EARLY 1961)
by Earl D. Hanson, Yale University
Animal diversity and the present status of our knowledge of the field.

THE LIFE OF THE GREEN PLANT (EARLY 1961)
by Arthur W. Galston, Yale University
A functional approach to the green plant and a view of how it copes with its major problems.

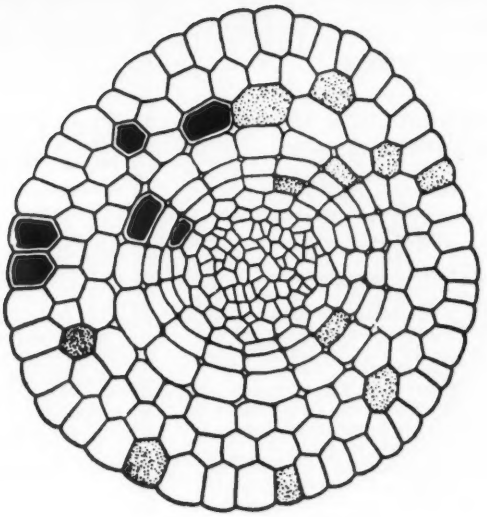
ADAPTATION (EARLY 1961)
by Bruce Wallace and A. M. Srb, both Cornell University
Theories of evolution and biological adaptation; population dynamics through time (evolution) and space (ecology); physiological and chemical mechanisms as isolation factors.

HEREDITY (EARLY 1961)
by David M. Bonner, Yale University School of Medicine
The physical and chemical nature of genetic material and how genes act as determinants of cell type.

ANIMAL BEHAVIOR (EARLY 1961)
by V. G. Dethier, University of Pennsylvania, and Eliot Stellar, University of Pennsylvania Medical School
An introduction to the principles of animal behavior that can be derived from the experimental study of many different species.

For approval copies, write: Box 903, Dept. AIBS
PRENTICE-HALL, Inc., Englewood Cliffs, New Jersey

Better texts for better classes from Prentice-Hall, Inc.



Throughout its publishing history Prentice-Hall has emphasized quality. Its texts are noted for combining clarity of style with scholastic integrity. This is especially true of the books published dealing with biology and allied sciences. The many adoptions testify to the confidence that biology professors have shown in Prentice-Hall books.

RADIATION BIOPHYSICS

by Howard L. Andrews,
National Institute of Health and Radiation Safety

Coordinating pertinent biophysical techniques essential to an understanding of radiation biophysics, this text provides the mathematical background needed for the treatment of radiation mortality data.

1961 *Price to be announced*

Prentice-Hall Physics Series

MILESTONES IN MICROBIOLOGY

by Thomas D. Brock,
Indiana University

A collection of the historically important papers in the field of microbiology, each paper has been translated into English, edited and abridged. These historical documents offer ideal material for the student. Their language is generally simpler—fewer technical words.

1961 *paperbound* *approx. 320 pp.* *Text price: $3.95*

ANIMAL ECOLOGY

by S. Charles Kendeigh
University of Illinois

A comprehensive, balanced survey and synthesis of the entire field of ecology which offers an introductory analysis of the fundamentals of: interrelations of organisms; niche segregation, speciation and dispersals; and wildlife management. The author interprets present-day world-wide distribution of ecological communities.

1961 *approx. 496 pp.* *Text price: $11.00*

For approval copies, write: Box 903, Dept. AIBS
PRENTICE-HALL, Inc., Englewood Cliffs, New Jersey

IMPORTANT

Laboratory Manuals in the Biological Sciences

AN INTRODUCTION TO THE EXPERIMENTAL METHOD

James Maxwell Little
Bowman Gray School of Medicine
Wake Forest College

This book is designed to introduce some of the principles of the experimental method. Special attention is given to the design of experiments and the evaluation of variation by the less complicated statistical methods. There is little use of technical terms, with full explanations where they are used. Mathematical manipulations are at the level of arithmetic and secondary school algebra. Concepts are emphasized, so that the reader will find this book a valuable aid in understanding reports of research. The investigator will find the book a valuable introduction to the more complex treatises on experimental design and statistical evaluation. Available March, 1961; price open.

PLANT PATHOLOGY LABORATORY MANUAL

Second Edition

J. P. Fulton, et al.
University of Arkansas

Four diseases have been added to this revised manual for more complete coverage of diseases and pathogens. Sections on plant rusts, viruses and nematodes have been extensively rewritten. It is useful for laboratory or non-laboratory courses since information studied in the laboratory is presented. 1960. $3.00

LABORATORY EXERCISES IN GENETICS

Fourth Edition

Howard A. Royle
Formerly George Fox College

Extensive revisions have been made, new exercises have been added, old ones expanded and some terminology brought up to date in this new edition. Contents include Cytogenetics, Drosophila Genetics and Human Genetics. It will accompany almost any standard text for an introductory course. 1960. $1.75.

order from

BURGESS
Publishing Company
426 South Sixth Street
Minneapolis 15, Minnesota

The AIBS Biological Sciences Curriculum Study

announces....

BSCS High School Biology

The BSCS is making the following 32 volumes available to interested persons at this time. These are preliminary editions of experimental materials and will be revised during 1961. They are not yet available for classroom use outside the BSCS Testing Program. The prices set for these volumes are cost, and therefore no discounts can be given or appraisal copies sent. Colorado residents should add the 2% sales tax. Mailings will be made as soon as possible.

TO ORDER VOLUMES SEND THIS FORM WITH YOUR CHECK TO:

BSCS High School Biology
Biological Sciences Curriculum Study
University of Colorado
Boulder, Colorado

SEND BOOKS TO:
_____
_____
_____
_____

———All BSCS materials listed below (32 volumes) $44.25

BSCS High School Biology, Blue, Yellow, and Green Versions

———Complete set all versions (27 vol.) $37.00

BLUE VERSION
———Complete set (9 vol.) $11.25
———Text (3 vol.) $3.50
———Lab Manual (3 vol.) $3.75
———Teacher's Guide to Lab Manual (3 vol.) $4.00

YELLOW VERSION
———Complete set (8 vol.) $11.75
———Text (2 vol.) $2.75
———Lab Manual (3 vol.) $4.50
———Teacher's Guide to Lab Manual (3 vol.) $4.50

GREEN VERSION
———Complete set (9 vol.) $12.75
———Text (3 vol.) $3.75
———Lab Manual (3 vol.) $4.25
———Teacher's Guide to Lab Manual (3 vol.) $4.75

ALL VERSIONS
———Teacher's Commentary (1 vol.) $1.25

Laboratory Blocks, Student Editions

———4 volume set $5.00
———*Microbes: their Growth, Nutrition and Interaction* $1.25
———*Animal Growth and Development* $1.25
———*Plant Growth and Development* $1.25
———*Interdependence of Structure and Function* $1.25

Gifted Student Materials

———*Biological Investigations for Secondary School Students* (1 vol.) $2.25

———Check for $———— enclosed ———Purchase order enclosed
(Wherever possible please include remittance.
Checks should be made payable to: BSCS).

The BSCS has prepared 3 techniques films to be used in conjunction with BSCS High School Biology. **For information write:** Biological Techniques, **BSCS, University of Colorado, Boulder, Colo.**

CARL ZEISS

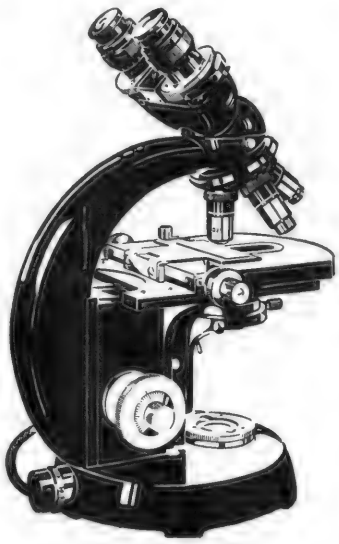
Research Microscope

MODEL WL

The latest optical and mechanical achievements are incorporated in the Carl Zeiss Research Microscope WL.

It is designed to meet today's demands of the microscopist for versatility and comfort in manipulation. This microscope is well suited for microscopic observation in bright-field, darkfield, phase contrast, polarized light as well as incident light.

Made in West Germany



Made in West Germany

Standard Microscope

MODEL GFL-654-632

Designed and built in accordance with experience gained from nearly a century of microscope manufacture, the Carl Zeiss Standard Microscope Model GFL-654-632 is an unusually efficient and flexible binocular microscope, incorporating the very latest optical and mechanical innovations to make laboratory, routine and research microscopy fast and easy.

Various other models are available, each equipped for, and suited to, the particular requirements involved.

The Carl Zeiss trade-mark is your guarantee of the most modern and finest equipment.

Literature on request

CARL ZEISS, INC.

485 FIFTH AVENUE, NEW YORK 17, N. Y.

COMPLETE SERVICE FACILITIES

Coming next month!

The 1961 edition of the introductory textbook that* Nature *described as "well-selected, clearly presented, and admirably illustrated"

ZOOLOGY, 3rd ed.

by A. M. WINCHESTER, *Professor and Chairman, Department of Biology, Stetson University*, and HARVEY B. LOVELL, *Professor of Biology, University of Louisville.*

Completely revised and reset, the 1961 edition of the Winchester and Lovell *Zoology* is enhanced by new and rewritten sections along with many new illustrations taken by Professor Winchester, who is noted for his vivid photographs of biological subjects. The lively presentation retains the general plan and organization of its successful predecessors but is somewhat more rigorous.

Revisions and Additions

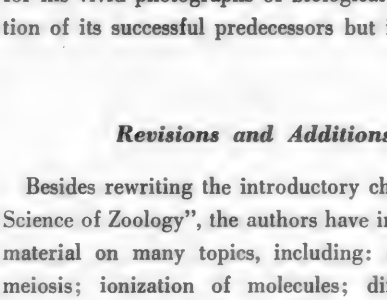
Besides rewriting the introductory chapter, "The Science of Zoology", the authors have included new material on many topics, including: mitosis and meiosis; ionization of molecules; diffusion and osmosis; protozoa; lampreys; the yellow perch; radioactive isotopes and their biological uses; acids and bases; cell metabolism; the Coelenterata; anatomy of the turtle; and the birds.

Teaching Aids

Contributing to the success of *Zoology* are its exceptional teaching aids, such as:

- extensive review questions at chapter endings;
- subheadings to simplify reference to specific topics;
- use of bold face type to indicate important terms;
- clear definitions of technical words when they first appear, so that students gradually develop an accurate technical vocabulary.

March, 1961 about 600 pages probably $6.75



Biologists' reactions to some recent proposed Federal legislation regulating the use of animals in biological studies

Hiden T. Cox
Executive Director, AIBS

How About a New Frontier in This Alley?

No less than four identical bills to regulate research using experimental animals were introduced in the 86th Congress. The Congress took no action upon any of these and at this writing no comparable bills have been introduced in the new Congress. There is a feeling around Washington, however, that a spate of similar bills will be dumped into the Congressional hopper shortly and it is perhaps well now to take a look at S3570—the Cooper Bill—which very likely will be the model for bills introduced during the current session. In passing, the other 86th Congress bills were HR 12587, HR 12621, and HR 12757 introduced by Representatives Martha Griffiths, Cleveland M. Bailey, and James Oliver, respectively.

The Cooper Bill (Senator John Sherman Cooper) was introduced on May 18, 1960 with the following co-sponsors: Senators Mansfield, Bartlett, Byrd of West Virginia, Kefauver, Morse, Proxmire, Randolph, Gruening, McNamara, Clark, Williams of New Jersey, and Church. Copies of the text may be obtained from Mr. Cooper's office or a mimeographed copy may be had from the AIBS. The bill provides for "the humane treatment of animals used in experiment and tests by recipients of grants from the United States and by agencies and instrumentalities of the United States Government, and for other purposes."

The bill states that anyone undertaking research using vertebrate animals under a United States Government grant must first obtain a license from the Secretary of Health, Education and Welfare. Next, the research worker must obtain a "Certificate of Compliance" from the Secretary. To do this he must (1) indicate compliance to certain requirements for animal care, and (2) file with the Secretary a detailed plan of his research project. Should he find it desirable to change his procedures during the course of his research project, presumably he must first obtain the Secretary's approval. He must submit annual detailed reports on this project, he is subject to inspection by a representative of the Secretary, and the project could be terminated if in the opinion of this representative there had not been compliance.

To the surprise of few, the Cooper Bill was greeted by something less than unanimous enthusiasm. All biologists, directly or indirectly, are affected by the provisions of this bill. Since this or any similar bill is aimed straightway at the research programs of a large proportion of biologists, the *AIBS Bulletin* should provide a means by which biologists can have their say. Below are several such comments. Others will be printed in future issues and you are invited to contribute your comments.

On October 28, 1960 the Animal Care Panel adopted the following resolution:

"A RESOLUTION ON SENATE BILL 3570 AND ITS COUNTERPARTS

WHEREAS, Senator John Sherman Cooper and 12 co-sponsors introduced Senate Bill 3570 on May 18, 1960 "to provide for the humane treatment of animals used in experiment and tests by recipients of grants from the United States and by agencies and instrumentalities of the United States government, and for other purposes;" and

WHEREAS, Representatives Martha Griffiths, Cleveland M. Bailey, and James C. Oliver introduced the same proposal in the House of Representatives, bearing the numbers HR 12587, 12621, and 12757 respectively; and

WHEREAS, these bills may be reintroduced in the 87th Congress; and

WHEREAS, these bills permit an unwarranted encroachment upon the research worker's freedom in conducting his research; and

WHEREAS implementation of these bills would require expensive, massive, and totally unproductive regulatory machinery; and

WHEREAS, these bills would delay the testing of new concepts and ideas, and would hinder and restrict medical and biological research; and

WHEREAS, the administrative requirements of the bills would significantly reduce the investigator's productive research time when his efforts are vital to our national and international interest; and

WHEREAS, numerous problems of interpretation

would be created by the vagueness in terminology of many of the provisions; and

WHEREAS, the bills contain no constructive provisions to deal with the real current needs in the field of laboratory animal care; namely to encourage serious research in significant animal care problems; to provide greater support of professional and technical training; to encourage even wider dissemination of factual information in the field; and to support the improvement of existing laboratory animal facilities and the construction of new facilities; and

WHEREAS, the bills would retard the objective of rational humane care for laboratory animals;

NOW THEREFORE BE IT RESOLVED that the Animal Care Panel opposes Senate Bill 3570 and House of Representative Bills 12587, 12621, and 12757, and urges the Congress not to give these legislative proposals further consideration.

BE IT FURTHER RESOLVED that the Animal Care Panel encourages greater support by private and federal agencies of research and training programs in laboratory animal care; of programs for the dissemination of factual information in the field; and of programs for the improvement of existing laboratory animal facilities and the construction of new facilities."

Maurice Visscher, former president of the American Physiological Society, has made the following analysis of the Cooper bill (the italics are his):

"The Bill S 3570 entitled "To provide for the humane treatment of animals used in experiment and tests by recipients of grants from the United States and by agencies and instrumentalities of the United States Government, *and for other purposes*," is one which requires the serious attention of every biologist in the United States. The first section of this Bill reads "That it is declared to be the policy of the United States that living vertebrate animals used for scientific experiments and tests shall be spared unnecessary pain and fear; that they shall be used *only* when no other feasible and satisfactory methods can be used *to ascertain* biological and scientific *information* for the *cure of disease, alleviation of suffering, prolongation of life* or for *military requirements;* and that all such animals shall be comfortably housed, well fed and humanely handled." I have underlined certain key words. Note that vertebrate animals may be used *only . . . to ascertain . . . information.* They, therefore, may not be used in teaching. Note that *only* medical and military uses are premitted. Such animals may not, therefore, according to a strict interpretation, be used to increase knowledge in pure science, nor even in agriculture or animal husbandry.

"The Bill would make a single person, the Secretary of Health, Education and Welfare, the virtual dictator of biological and medical science research in the United States (See Sections 3, 4, 5, 6, 7, 8, and 9). He could decide (Section 9) whether a proposed experiment suited his rules and regulations and deny authorization to perform it.

"Section 4 f is in conflict with Section 1, and also sets up an absurd regulation, namely, that all animals used for surgical training be sacrificed before the most important results of the surgery are known. Survival of the patient is the most important objective in surgery and only a fanatic would want to deprive young surgeons of opportunity to learn how to accomplish this.

"This Bill if enacted in anything like its present form would put a tremendous burden on all U. S. biological and medical scientists, as well as on the Dept. of HEW, and would cost untold millions of dollars to administer. It seeks to remedy the virtually non-existent evil of "cruelty to animals" in science laboratories. Most scientists believe that no regulatory measures are needed because scientists are in general very careful now. Anti-cruelty laws exist but no professional scientist has ever been convicted of cruelty in relation to a scientific laboratory experiment. This Bill may be well-intentioned but it is misguided and should not be re-introduced into the next Congress. It can only harm the position of the United States in teaching and research in science."

A. B. Otis, Professor and Head of the Department of Physiology, the J. Hillis Miller Health Center of the University of Florida, has sent us a similar analysis:

"Some Comments regarding Bill S 3570.

"I should like briefly to offer some personal views regarding Senate Bill S 3570, which was introduced by Senator Cooper on May 18.

"The apparent objective of this bill is to insure that experimental research involving vertebrate animals shall be conducted in a humane fashion. Although I strongly believe in the humane treatment of animals, I am at the same time opposed to this bill because I feel that it is both unnecessary and undesirable.

"It is unnecessary because: (1) No significant number of scientists are inhumane in their treatment of animals. Those few who might tend to be careless in this regard are subject to the pressure of disapproval from their colleagues. (2) Voluntary professional organizations are actively and effectively engaged in improving the care of experimental animals. An outstanding example of such an organization is the Animal Care Panel, which includes in its membership animal caretakers, veterinarians, supervisors, researchers, animal suppliers and manufacturers of feed and equipment. Through its meetings, symposia and publications it encourages research and disseminates information related to improvement in the health and care of laboratory animals. (3) Such organizations as the American Physiological Society, the American Medical Association, and the National Society for Medical Research have published sets of principles for the guidance of their members in the procurement, care and use of experimental laboratory animals. These guiding principles form a code of ethics emphasizing the humane aspects of animal experimentation and serve as a reminder that such experimentation is a serious and responsible activity for professional biologists, and not something to be undertaken lightly. Furthermore, such guiding principles are officially recognized. For example, investigators working under contract with the U. S. Air Force

are required to sign a statement certifying compliance with one of these codes. (4) Scientific journals, which publish the results of experimental animal research, can, by editorial policy, discourage the practice of inhumane procedures. In the case of the *American Journal of Physiology* and the *Journal of Applied Physiology*, for example, papers submitted for publication are editorially evaluated not only as to their scientific merit but also as to whether the experimental procedures involved meet humane standards. If, in the judgment of the reviewing editors, a paper is based on experiments involving unnecessarily cruel or inhumane procedures, it is not acceptable for publication. Such papers are, fortunately and commendably, rare. (5) The need for a continuing study of problems related to the use of animals in experimental research is well recognized by professional societies. For example, the American Physiological Society maintains a standing Committee on the Care and Use of Animals, whose function is to study such problems as may arise and to make recommendations regarding such problems to the Council of the Society.

"Such a bill as S 3570 is undesirable because: (1) It would add significantly to the cost of administering Government-supported research, and the amount of paper work involved would be increased both for scientists and for the Government agency sponsoring the research. (2) The additional time required for paper work by the scientists and the additional delays involved in awarding grants would hamper productivity of medical research. (3) It is essentially a negative bill in that it provides only for rules and regulations. It provides for nothing positive in the way of education or research that would lead to continuing improvement in the care of animals.

"In summary, I feel that such problems as may exist are being capably handled by voluntary professional organizations and their individual members, and that such legislative action as S 3570 would only lead to a needless complexity of technical requirements having no constructive features."

H. D. Rollason, Jr., Associate Professor of Zoology, University of Massachusetts, wrote the following letter to the Editor of the *Bulletin* dated November 4, 1960:

"In the September News Letter you make reference to a bill introduced by Sen. Cooper as S 3570 which would regulate the use of experimental animals. This bill is surely of vital concern to the entire population though its implications are probably not generally recognized. It appears to me that the groups which support such legislation are increasing in strength constantly, and it is becoming imperative that all biologists make the members of the Senate aware of its dangers. May I suggest, therefore, that a card stating opposition to this and similar bills and requiring only a signature be included in a future News Letter in the hope that these would be mailed and thus serve as a petition. Few of us get around to writing to our Senators, but many might well sign and mail a card."

Lester R. Dragstedt, President of the National Society for Medical Research, has cited 9 reasons why "the scientific community opposes Federal regulation of research in biology and medicine:

"(1) Presumably the proposal to police medical and biological research was introduced on the assumption that, at the present time, there exists significant mistreatment of animals in research and teaching laboratories. This is a false assumption. It is insulting to the men who are devoting their lives to scientific research and to the administrative officials in charge of the various institutions where research employing animals is done. If the Congress is in doubt about this matter, an investigation should be ordered before regulatory or punitive measures are considered.

"(2) It is not reasonable to assume that police inspectors could be hired by the Secretary of Health, Education and Welfare who would be wiser, kinder and better qualified technically to supervise the conduct of scientific research than are the university presidents, deans of medical schools, directors of research institutes and academic department heads who now bear responsibility for the character of animal research in the United States.

"(3) The bill to regulate research offers no constructive provisions for improving laboratory animal care but, on the contrary, provides numerous handicaps and hazards to scientific investigation. No provisions are made for research to develop better methods, training to develop better qualified personnel and appropriations for better facilities.

"(4) The bill states that, '. . . living vertebrate animals shall be used only when no other feasible and satisfactory methods can be used to ascertain biological scientific information for the cure of disease . . .' Strictly interpreted this would stop all medical and biological research except on plants and microbes for thousands of years until scientists could be sure that every possibility for the use of such lower forms of life in the solution of medical problems has been exhausted. Then and only then could the full range of modern research methods be employed.

"(5) The proposed federal regulation of research includes the provision that no experiment or test on living animals shall be performed unless a detailed project plan is approved by the Secretary of Health, Education, and Welfare. The project plan must describe in advance all procedures to be employed with respect to living animals. This provision assumes that the investigator knows, in advance, each step in his research program. Such is not the case. The general objective is known, but the method of attack develops as the work progresses. Fruitless avenues are abandoned and new and developing leads followed as they open up. Indeed, the entire objective may be abandoned in favor of some newer objective that has come into view as the work progresses. The stringent regulation proposed would stifle real exploratory research and favor more perfunctory technological exercises where the outcome is already known in advance.

"(6) The proposed law to regulate research demands that records be kept of experiments, that animals be identified in relation to these experiments

and that the disposition of animals also be recorded. Annual reports based on these records are to be made to Washington. Presumably the records to be maintained and the reports to be made are in addition to the already extensive records essential to the collection and reporting of scientific data. It is likely, therefore, that these scientifically useless reports would approximately double the burden of record-keeping in conjunction with research. Not only would allocations for research be drained away in the employment of extra secretarial help, but also in Washington large numbers of clerks would have to read, sort and file a mountain of such useless reports.

"(7) The proposed law would authorize the Secretary of Health, Education and Welfare to appoint inspectors with authority to examine the records of individual scientists and to stop investigations and destroy the animals if, in the judgment of the inspectors, the plans outlined in advance had not been followed accurately. The inspectors obviously would have power that could be misused to strangle research.

"(8) In discussing proposed special policing of scientists, Professor Maurice B. Visscher has made use of the following useful analogy: 'Cruelty to children is and should be a crime. Some parents have been known to abuse their children. However, we do not, and I hope will not, set up governmental licensing bureaus to regulate which families may have children and to snoop on all homes to catch those infinitesimally few parents who beat their babies. We who love children know that such an espionage system would destroy more values than it would salvage.' All of the 50 states in the Union have statutes prohibiting cruelty to animals. In every instance these laws govern the work of medical scientist as well as other citizens. No scientists in the United States has ever been convicted of mistreating animals despite energetic policing of this possibility by the antivivisection cult.

"(9) The United States leads the world in medical research. This leadership not only makes our nation healthy and strong, it makes the United States a great world benefactor, for discoveries made here alleviate suffering and save lives everywhere. Much of the progress in medical science in the United States is due to substantial government support of research. The value of governmental support depends in great degree upon care to avoid excessive bureaucratic pressures that could make government support more destructive than beneficial. The object of research is innovation and innovation demands a reasonable degree of freedom.

"Indeed, it is undoubtedly true that the great achievements of the American people in science and technology since the founding days of the Republic have been due more to the free political environment of the United States than to any other factor. Here unregimented minds have been free to create, and they have created more new things than any society that ever has existed on this earth.

"It is important to understand how closely the scientific leadership of the United States is tied to America's historic abhorrence of regimentation."

The pressures which result in a Cooper Bill are not restricted to research alone. In 1960 a subcommittee of the AIBS Committee on Education, under chairmanship of C. Ladd Prosser, felt it both desirable and necessary to join many other groups in issuing a code for use of animals in High School Biology Courses. Although it has been published widely, I think it is not out of place to restate it here as just one of many evidences of how scientists are and long have been concerned with humane treatment of laboratory animals.

CODE FOR USE OF ANIMALS IN HIGH SCHOOL BIOLOGY COURSES

"The first aim of demonstrations that involve animals in high school science courses is to achieve an understanding of life processes. Such studies lead to a sympathetic respect for life. A second aim of animal studies is to provide future citizens with some knowledge of the principles of health, disease and medicine and of some aspects of agriculture. In addition, by achieving these goals, some students are motivated to become the medical and biological scientists of the future.

"Experiments which are useful for high school students are not necessarily the same as those which would be done in a university or medical school. Much can be learned about life processes from microorganisms and plants; invertebrates and cold-blooded vertebrates can be used for many animal studies in high schools, but birds and mammals are essential to the demonstration of certain concepts because of their closer similarities to man. The same guiding principle of respect for life in the use of animals for the welfare of man should apply in the study of all living objects including the conservation of useful plants.

"All observations on animals must be performed in a humane fashion and anesthetics used as appropriate for the kind of organism, the intactness of the animal and the type of observation.

"To guarantee that students acquire the spirit of humane treatment of animals, a qualified adult supervisor must assume primary responsibility for planning and conduct of demonstrations involving intact living animals. Such supervision must extend to both classroom and extracurricular projects.

"Proper quarters and care must be provided at all times, including vacation periods. Students should be instructed in the principles of humane treatment of animals and training in the proper handling of animals should be a part of the preparation of all high school biology teachers."

Recently a copy of a letter was sent to me which illustrates, it seems to me, the really rather admirable diligence of those who are concerned with a certain impact biology is presumed to have upon young people. It was a letter from the Corresponding Secretary of the Chicago and Cook County Federation of Women's Organizations to a Mr. C. H. Kellstadt of Sears Roebuck and Company.

(Continued on page 20)

A survey of the educational program and college faculty attitudes and recommendations

Committee for Education
Society for Industrial Microbiology

An Evaluation of College Curricula for Industrial Orientation in Microbiology

INDUSTRY'S requirements for microbiologists continues to be manifest in such diverse fields as pharmaceuticals, food technology, brewing, wood preservation, rope and cordage, packaging, paints, oil drilling, cotton textiles, elastomers and plastics. Industry often has found it necessary to establish accelerated training programs to better equip recently recruited college graduates in their approach to applied problems even though they may have majored in microbiology. This, obviously, is a costly undertaking which may be obviated if the students were oriented to practical industrial problems during their collegiate preparation.

An evaluation of college curricula, as these pertain to majors in microbiology, was made by the Society for Industrial Microbiology to ascertain whether it would be desirable to achieve practical orientation in at least some part of the prescribed course of study. The Society for Industrial Microbiology elected to survey colleges and universities because professional training and the motivation toward its accomplishment begins here. Motivation without student discrimination may not be motivation at all. It is conceivable, however, that the Bachelor's degree could be made to fill the need for competent scientific personnel.

The questionnaire directed to staff members of a large number of colleges and universities was designed to measure 1) the efficacy of the curriculum for majors in microbiology; 2) the attitudes and dispositions of teachers towards the course of study they now present; and, 3) recommendations for improvement of the current training program for majors in microbiology. This report summarizes the information obtained to date in these three principal areas of questioning, and collates the comments obtained from 30 separate interviews.

The Educational Program

Majors in microbiology are required to have training in mycology, bacteriology, microbial physiology and parasitology in from 70 to 80 per cent of the cases interviewed. It appears, therefore, that the requirement for these subjects is essentially universal. With respect to the special interests of a given department, from 10 to 30 per cent of the schools represented stipulated course work in fermentations, protozoology, nematology, microbial genetics, industrial wastes, food, water and dairy bacteriology, virology and immunology.

Basic requirements for majors in microbiology varied, from 3 to 12 credits in mathematics, 0 to 8 credits in physics and 8 to 31 credits in undergraduate chemistry. This wide variation in basic requirements possibly reflects a tacit appreciation of the lesser value of the Bachelor's degree in microbiology. There are some who believe that only people with advanced degrees may function effectively in professional capacities. At least two problems arise because of this view:

1) We may expect (and get) some schools which establish minimal requirements for majors in microbiology thereby creating minimal microbiologists whose academic deficiencies are to be overcome only with further study. Such microbiologists are, in part, those requiring extra-collegiate training courses or more informal indoctrination before being able to assist intelligently in any research effort.
2) We may expect graduate schools to object, as indeed they do, to such casual undergraduate standards, making it necessary to extend graduate study in order to fulfill course work that should have been accomplished at the undergraduate level.

Eighty per cent of those interviewed reported that few to many aspects of industrial microbiology are reviewed within the context of courses in fermentation, antiseptics and disinfectants, dairy bacteriology, soils, food technology and mycology. Twenty per cent of the schools represented reported no effort made to discuss industrial problems. Industrial problems were considered by these to be the province of Schools of Technology rather than of a College of Arts and Sciences.

Undergraduate majors in microbiology are not required to accomplish a research project in 50 per cent of the schools sampled. In 40 per cent of the schools represented, undergraduate research may be performed as honors or if specifically requested by the student. However, not less than 75 per cent of these research projects are of a fundamental nature. Only 10 per cent of the schools required completion of a research project for accreditation towards a major in microbiology.

Half the schools sampled require training in techniques and instrumentation in the undergraduate course. Ten per cent of the schools require graduate students to have formal training in techniques and instrumentation. Forty per cent of the schools require no course training in techniques and instrumentation, but expect the student to apply to his major interest his knowledge of techniques and instrumentation gained from his course work.

Staff Attitudes

All schools review to a greater or lesser extent the accomplishments made in industrial microbiology. In 40 per cent of the schools sampled no effort is reported to be made to direct microbiology majors towards industry. Only some industrial orientation is given in 50 per cent of the schools, and in 10 per cent of the schools, staff direction towards industry is given only to students making such a request.

It is revealing that 20 per cent of those interviewed rated their colleagues as being essentially unaware of industrial problems. Fifty per cent reported that their colleagues had some knowledge of industrial problems, yet 33 per cent of these reported no effort being made to orient the undergraduate towards industrial microbiology.

Seventy-five to 80 per cent of the graduates were reported by 20 per cent of the schools represented to have sought and obtained employment in industry. Eighty per cent of the schools sampled reported highly varied proportions of students to have continued in advanced study, or to have accepted employment in universities, federal civil service and research institutions. Ten per cent of the schools represented were unaware of the kind of employment secured by 40 to 50 per cent of their recent graduates.

Recommendations Made

Twenty per cent of those interviewed of assistant professorial and professorial rank recommended the need of a well balanced faculty to enhance student preparation for industrial positions.

Fifty per cent believed that the standards should be elevated. Thirty per cent recommended more extensive course work specifically in fermentation, virology techniques, mathematics, physics, chemistry and biology. Twenty per cent believed that industrial orientation was more appropriately the function of a School of Technology rather than one of Arts and Sciences, and increased standards are important for academic reasons only. Ten per cent (professorial rank) recommended that industry make known its needs. Ten per cent (professional rank) recommended that industrial orientation is not appropriate for undergraduates, but should be given in a seminar early in graduate study. Ten per cent made no recommendations.

Committee Remarks in Evaluation of the Survey

The information gathered by this survey is the result of the efforts of the Society for Industrial Microbiology to define the extent of industrial orientation given college majors in microbiology. Based on this survey it appears both necessary and desirable to further a more comprehensive appreciation of:

1) The accomplishments being made in industrial microbiology.
2) The extent to which industrial microbiology may be a challenging and absorbing pursuit for current microbiology majors.

The publication, "Developments in Industrial Microbiology" sponsored by the Society for Industrial Microbiology may serve as a source of such information. The SIM may perform a considerable service to industry and our collegiate institutions by circularizing information on industrial microbiological developments. Faculties and students familiarized with patents, published reports and research and development activity of industrial microbiologists, will be in a better position to respond to the requirements of American industry. This may be accomplished by way of an Information Center created as a permanent committee by the Society for Industrial Microbiology.

A Speakers Bureau functioning under the direction of the Society for Industrial Microbiology through its local sections should supplement this dissemination of information. Speakers must be chosen with care and discrimination in order to present industrial microbiology to students and faculties of our colleges. Thus the scope and opportunities in industrial microbiology will be made better known.

Elimination of redundant course work would be as beneficial for college curricula as would an increase in the academic standards. This view is held by many of the educators responding to the survey. That there appears to be a serious lack of industrial orientation at the undergraduate level in our colleges is a plain and simple fact emerging from this survey. The recommendation by the Education Committee for a greater awareness of the accomplishments and opportunities in industry through an industrial orientation at the undergraduate level is not meant to imply, nor should it be inferred, that applied industrial microbiology should replace training in sound fundamentals considered no less essential by industry than by our educators. However, a comprehensive approach to collegiate training in microbiology must not deny the accomplishments of industry; and an educational program to merit comprehensiveness should create, at least, an awareness for the trainee of the problems and accomplishments made in industrial microbiology.

(Continued on page 20)

A Description of New Field Facilities for Teaching and Research

Richard H. Goodwin
Connecticut College, New London

The Nature Conservancy Preserves

THE NATURE CONSERVANCY is a nonprofit membership organization dedicated to the preservation, in their natural state, of biologically or geologically significant samples of the American landscape. It had its inception in 1917 as a Committee on Natural Areas of the Ecological Society of America. In 1946 the members of this Committee, desirous of establishing an effective action group, formed the Ecologists Union, and four years later the name was changed to the present one, borrowed from the British governmental agency concerned with the preservation of natural areas for scientific research.

The work of The Nature Conservancy is directed by a Board of Governors elected by the membership. The principal concern of the Board has been the acquisition throughout the country of representative habitats of all types for scientific purposes. Responsibility for specific projects is delegated to local project committees which are either directly under the jurisdiction of the national organization or, more frequently, of a state chapter within which the preserve is located. Before authorizing a new project it is screened by one of four National Natural Areas Advisory Panels appointed by the Board from among the Nature Conservancy's scientific members.

The Nature Conservancy promotes the establishment of preserves in a number of different ways. It may acquire them directly by gift either with or without endowment to defray management expenses. It may purchase areas with funds raised especially for this purpose. It has a special national fund to aid project committees with loans and sometimes with grants on a matching basis. It also aids other organizations in various ways—with legal counsel, with financial assistance, and with moral support in cases where preserves are threatened with encroachment. In several instances the Conservancy has been named as a revertee in deeds imposing legal restrictions on the use of property given to institutions for scientific purposes.

The program of The Nature Conservancy for the establishment of a series of natural area preserves as a basic resource for education and scientific research has been gaining momentum during the past two years. In 1958 a summary of the fifteen preserves (about 1550 acres) owned by this organization was published.[1] Since then twenty-three additional natural areas totalling 6267 acres have been established, while five of the original fifteen have been increased in size by a total of 156 acres. Title to two others has been conveyed to the University of Illinois, which has accepted the responsibility for their maintenance.

The permanence of these preserves lends especial significance to long-range research which documents any aspect of their natural history. The Nature Conservancy invites properly qualified scientists to make use of these facilities. Any research program must, of course, conform to the policies and regulations established for the particular preserve. The nature and location of the Nature Conservancy's present holdings are listed in Table 1 (p. 18). Inquiries should be addressed to national headquarters at 2039 K Street, N.W., Washington 6, D. C.

Nine other preserves aided legally and/or financially by the Conservancy's program are given in Table 2 (p. 20). In addition, the Conservancy has helped establish and/or protect numerous natural areas under other ownership.

The support of every person interested in the preservation of teaching and research areas is solicited in behalf of this program. Is there a tract near your institution or in your locality that needs permanent protection? A letter addressed to national headquarters will put you in touch with the nearest Nature Conservancy chapter or state representative. A membership in the organization will bring you news of current developments and will help to strengthen the program.

REFERENCE

1. GOODWIN, R. H. 1958. Nature Preserves recently established by the Nature Conservancy. AIBS Bull. 8(3): 20-21.

TABLE 1. *Preserves now owned by The Nature Conservancy or under purchase contract*

Name and Location	Year Established	Present Acreage	Type of Habitat and Special Features
CALIFORNIA			
Northern California Coast Range Preserve, Mendocino Co.	1958	2915 [d, e]	Old-growth Douglas fir, tanbark oak and madrone; cross section of vegetation of region; virgin watershed of Elder Creek.
Black Chasm Cave, Volcano, Amador Co.	1959	5 [f]	Limestone cave formations.
Buena Vista Lagoon, San Diego Co.	1960	24 [b]	A series of fresh-water lagoons formed by sand bars at the mouth of an estuary; outstanding refuge for migrating water birds.
CONNECTICUT			
Frederic C. Walcott Preserve, Litchfield Co.	1956	278 [a, d]	Black spruce bog and 12-acre Beckley Pond surrounded by forest of northern hardwoods, pine and hemlock.
Akeley Tract, New London Co.	1960	8 [b]	Deciduous woodlands.
Burham Brook Preserve, Middlesex Co.	1960	46 [b]	Hemlock and mixed hardwoods forest; ravine traversed by spring-fed stream.
Cotton Hollow, Hartford Co.	1960	5 [b]	Wooded ravine.
INDIANA			
Pine Hills, Montgomery Co.	1957	600 [a, c, g]	Spectacular sandstone cliffs and ridges formed by entrenched meanders; extensive stands of white pine, hemlock and mixed hardwoods; adjacent to the Shades State Park.
ILLINOIS			
Rocky Branch, Clark Co.	[h]	40	Wooded ravine with rich herbaceous flora; northern and southern species found in this area.
MARYLAND			
Battle Creek Cypress Swamp, Calvert Co.	1956	100 [a, c]	Northernmost stand of bald cypress on the western shore of Chesapeake Bay.
Hellen Creek Hemlocks Preserve, Calvert Co.	1956	21 [a]	Mature hemlock stand at the edge of tidewater; beech, oak and Virginia pine also on the property.
MASSACHUSETTS			
Black Pond, Plymouth Co.	[h]	10	Pond surrounded by white cedar *Sphagnum* bog.
MINNESOTA			
Caledonia Oaks Preserve, Houston Co.	1956	80 [a]	Old-growth oak forest.
MISSOURI			
Holly Ridge Preserve, Stoddard Co.	1958	80 [a, c]	Sandy ridge with native stand of *Ilex opaca*.
Carsonhurst, Jefferson Co.	1959	55 [b, i]	Oak-hickory woodland with mixed cedar openings, Riparian land along Mississippi River.
Hyer Woods, Dent Co.	1959	30 [b]	Stand of virgin white oak.
NEW HAMPSHIRE			
Lousi Cabot Preserve, Cheshire Co.	1960	400 [d, j]	Wooded peninsula with shore frontage on Lakes Nubanusit and Spoonwood; white pine, northern hardwoods, abandoned pasture.
NEW YORK			
Mianus River Gorge Preserve, Westchester Co.	1954	182 [d, k]	Mature hemlock stand and old-growth hardwoods in deep ravine.
Arthur W. Butler Memorial Sanctuary, Westchester Co.	1954	251 [b, l]	Swamp, stream, meadow and upland hardwood forest on rocky ridge.
Smoky Hollow Bog, Fire Island, Suffolk Co., Long Island	1956	1 [b]	Bog in interdunal depression.

TABLE 1—*Continued*

Name and Location	Year Established	Present Acreage	Type of Habitat and Special Features
NEW YORK (cont'd.)			
Wolf Swamp Sanctuary, Suffolk Co., Long Island	1957	20 [b]	Deciduous forest and marshy shore of a fresh-water pond (Lake Missapaque).
Kings Point Pond Preserve, Great Neck, Nassau Co., Long Island	1957	15 [b]	Fresh-water pond, an important shelter for waterfowl in migration.
Dome Island Preserve, Lake George, Warren Co.	1957	10 [b, m]	Mature forest of mixed hardwoods and conifers on an island composed of a drumlin.
Moss Lake Nature Sanctuary, Allegany Co.	1958	81 [a]	Kettle lake and bog heath surrounded by hemlock and hardwood forest.
Pawling Nature Preserve, Dutchess Co.	1958	1041 [b]	Upland hardwood forest and low swampy woodland; ridge traversed by Applachian Trail.
Thompson Pond Preserve, Dutchess Co.	1958	173 [a, e]	Shallow, glacial lake notable for its marshy and aquatic vegetation and associated wildlife.
Delafield Woods Preserve, Suffolk Co., Long Island	1959	7 [b]	Open forest of mature hardwoods.
Little Bear Swamp Preserve, Albany Co.	1960	100 [a, c]	Swampy woodland notable for its 30-acre stand of *Rhododendron maximum.*
Tommy Thurber Memorial, Westchester Co.	1960	6 [n]	Wooded swamp.
Deer Lick Sanctuary, Cattaraugus Co.	1960	313 [e]	Hardwood bottomland forest along Cattaraugus Creek.
OHIO			
Lucy Braun Preserve (Lynx Prairie), Adams Co.	1959	44 [a, e]	A typical prairie flora on thin limestone soil with many species locally rare.
Buzzardroost Rock Preserve, Adams Co.	1960	70 [a, e]	A high promontory of Silurian dolomite rising vertically above steep forested slopes, with a small *Andropogon-Bouteloua* prairie.
PENNSYLVANIA			
Cranberry Bog Preserve, Tannersville, Monroe Co.	1956	72 [a]	Low-altitude spruce bog just north of the terminal moraine.
Woodbourne Forest and Wildlife Sanctuary, Susquehanna Co.	1956	478 [b, l]	Old-growth hemlock and hardwood forest (200 acres), swamp, bog pond, second growth forest, conifer plantation, and meadows.
WEST VIRGINIA			
Cranesville Swamp, Preston Co.	1960	290 [a]	Outstanding northern bog with tamarack, black spruce, and associated northern species of plants and animals.
WISCONSIN			
Abraham's Woods, Dane Co.	1960	5 [a]	Old-growth maple-basswood-elm forest.

[a] Acquired by purchase.
[b] Acquired by gift.
[c] Funds being solicited for expense of purchase.
[d] Funds being solicited for purchase and maintenance.
[e] Under purchase contract.
[f] Leased. Under management of the San Francisco Chapter of the National Speleological Society.
[g] Held in trust for reconveying to the State of Indiana as a natural area.
[h] Under option.
[i] Funds being solicited to liquidate mortgage.
[j] 200 acres acquired by purchase; 200 acres under option.
[k] Acquired by purchase and gift.
[l] Endowment maintenance fund the gift of the original donor.
[m] Endowment maintenance fund raised through contributions.
[n] 0.6 acres acquired by gift; 5.4 acres leased.

TABLE 2. *Preserves aided legally and/or financially by The Nature Conservancy*

Name and Location	Present Ownership	Acreage	Type of Habitat
CONNECTICUT			
Mamacoke Island, New London Co.	Connecticut College [a]	41	Rocky deciduous woodland and salt marsh
FLORIDA			
Corkscrew Swamp [b], Collier Co.	National Audubon Soc.	5760	Sawgrass marsh, virgin cypress forest, pond apple "runs" and surrounding pine woods.
ILLINOIS			
Volo Bog [c], Lake Co.	University of Illinois [a]	47	Tamarack bog surrounding small bog lake
Wauconda Bog [c], Lake Co.	University of Illinois [a]	67	Mature tamarack bog.
MICHIGAN			
South Manitou Island [f], Leelanau Co.	State of Michigan	80	Perched dunes and cedar forest.
MISSOURI			
Tucker Prairie [c], Callaway Co.	University of Missouri	140	Tall-grass prairie.
NEW JERSEY			
William L. Hutcheson Memorial Forest, Somerset Co.	Rutgers University [a]	135	65-acre remnant of pre-colonial hardwood forest (Mettlers Woods) and buffer area.
NEW YORK			
Sunken Forest Preserve [e], Fire Island, Suffolk Co., Long Island	Sunken Forest Preserve, Inc.	61	Bay-to-beach segment of Fire Island one-half mile long, including beach, sand dunes and mature barrier-beach forest of holly, oak and pine.
Bergen Swamp [d], Genesee Co.	Bergen Swamp Preservation Soc.	1116	Extensive open marl beds, white cedar swamp and surrounding forest of conifers and hardwoods.

[a] Reverter clause to The Nature Conservancy in the deed of gift.
[b] $5,000 raised for purchase through a general solicitation of The Nature Conservancy membership and $135,000 raised through the efforts of Mr. Richard H. Pough, who at that time was President of The Nature Conservancy.
[c] A portion of the purchase price contributed through The Nature Conservancy.
[d] $3,000 gift for land purchase made through The Nature Conservancy.
[e] Purchased by The Nature Conservancy through funds raised. Title conveyed to University of Illinois.
[f] Purchased with a loan from The Nature Conservancy.

How About a New Frontier in this Alley?

(Continued from page 14)

"Dear Sir, At both the Board meeting and the full session of the Chicago and Cook County Federation of Women's Organizations held October 28, 1960, an article in your Christmas catalogue was discussed —that on page 410, in which you offer biology specimen kits and dissecting equipment for sale to *young people.*

"It is likely you may have had protests on this. No thoughtful group of delegate women—mothers and grandmothers—can but be dismayed at such an offer by one of the largest mail order organizations in the nation.

"Seemingly children and (*sic*) born with a latent cruelty, now accentuated by biology classes. The public is aware of unsolved murders, and in some of these a knowledge of dissection is indicated.

"Therefore it is felt that your offer is most unwise. Women do most of the buying, a fact that Sears Roebuck surely knows. It is too late to do anything about this catalogue, but this group of organized women strongly urges that the offer be discontinued in the future."

An Evaluation of College Curricula

(Continued from page 16)

The survey by the SIM Education Committee should be extended in the future to a review of industry's problems with respect to new recruits in microbiology. Information obtained from this review could be offered to colleges and universities, for however they may use it, to increase the placement of their graduates in industry. It might be advisable to invite other biological science groups to join with us in declaring nationwide recommendations applicable to all. This may be accomplished under the auspices of the American Institute for Biological Sciences.

We acknowledge with sincere appreciation the thorough efforts made by all individuals interviewed, making possible this survey. The Committee gratefully acknowledges the effort of Dr. Jack J. Stockton of Michigan State University who voluntered his services in Dr. Sanclemente's behalf during his sabbatical. *The Education Committee: Dr. A. David Baskin, Chairman, Dr. Paul F. Klens, Dr. C. Bruce Lee, Dr. C. L. Sanclemente, and Dr. L. S. McClung.*

At the 7th General Assembly of the International Union for Conservation of Nature and Natural Resources

Fairfield Osborn

President, New York Zoological Society

Keynote Address

ON BEHALF of this assembly of conservationists from every continent of the earth, allow me to express our profound gratitude to our Polish hosts who have so thoughtfully and energetically arranged for our assembly here. We are glad to be meeting here in this historic city that has opened its gates to us.

I must also express the debt my fellow Americans feel to European concepts of how Nature and man may survive together. *Gradually we Americans are learning something that you Europeans learned long ago.* We are leaving behind us our shibboleth that "Nature must be conquered" and are finally recognizing the ultimate truth that man must work with Nature and not against it.

Had we studied history more carefully we could have avoided the dreadful practices that earlier led us to widespread and ruthless destruction of forest and soils, and injury to waterways.

An observation appearing in the Book of Job, recorded in the fourth century before Christ, says "Speak to the Earth and it shall teach thee." We failed to heed this. Cicero, 50 years before the birth of Christ, stated "To rebel against Nature—is that not to fight like mere giants against the mighty gods?" We failed to heed this. Montaigne wrote, almost 400 years ago, "Nature can do all, and doth all." We failed to heed this.

Several years ago I, myself, endeavored to define the meaning of the word *"Nature"* and concluded that "Nature represents the sum total of conditions and principles which influence, indeed govern, the existence of all living things, man included."

In my country we have come to realize, even though belatedly, the fatality of our earlier actions. Consequently, there is far wider public recognition of the essential values of conservation. This is evidenced in many ways. Our government responds more readily to the views of conservationists. Large corporations are taking greater responsibility for the abatement of water and air pollution and are commencing to lend their support to educational programs concerned with the better use of natural resources. The Canadian Government has joined with ours in the establishment of the Quetico-Superior wilderness area, and these two Governments, joined by that of Mexico, have made common cause in the protection of the migratory flyways of birds. The values of National and State Parks are now generally acclaimed and increased amounts of public funds are being appropriated for their development. Yes, we *are* making progress. Our eyes are being opened, as must be the eyes of people everywhere, that *man's ultimate welfare will be measured by the degree to which he works in harmony with natural laws rather than in discord and in combat with them.* Actually, this objective to be achieved through international cooperation spells the essential value and purpose of this International Union. The need for the work of the Union increases as each year passes, for reasons which I shall touch upon shortly.

I stand here and look at this gathering of hundreds of people from some 30 different nations, and profoundly admire the impulse that has brought us all together. What are we seeking? Personal or financial gain? No. Racial or political ascendancy? No. The truth is that this is an assembly of individuals of different skills, cultures, and backgrounds who have come to discuss and compare their experiences in their specialized fields, but above all—and this is of paramount importance—to encourage worthwhile action on the part of people and their governments to preserve and properly use the heritages of Nature which, if once lost, are gone forever.

This Union of individuals from many lands, bound together by a common purpose, came into being only twelve years ago. Then it was only a vision in the minds of a few men. Today it is beginning to mature, too slowly some of us may think, but surely and inevitably. We who are here, and countless others in various countries, are embarked upon a movement of essential importance to all people everywhere. The degree of success of the Union's work will prove a barometer, either negatively or positively, by which future human welfare may be measured. But we must

realize that the tide of contemporary events threatens to eclipse and even undo many of the objectives we seek.

In these difficult times of tension between nations it is indeed deplorable that so vast a flow of skills and resources must be directed into programs of "Defense". As a corrollary to this situation, the new prodigies of scientific achievements are propelling much of our energies into the conquest of outer space—and even to the search for new planets that might one day become the new homes of mankind. These adventures mesmerize us into believing that they may ultimately have some practical value. The possibility that this is so is indeed remote. Yet the more powerful nations of the world press forward, spending vast sums of money, to see which can outdistance the others in this mad quest. The fable of Icarus still lives. At the end, Icarus returned to the earth.

Likewise, at the end, the problem of modern man will be not whether he can land on a remote planet, but *whether he can sustain the productivity of his present earth-home and make sure that it shall be a habitable place for future generations.*

One dares to say that our earth is becoming less and less habitable. If this seems too generalized a statement, let us consider some of the circumstances that seem to justify it. First, we face the dilemma resulting from the constant, rapid and steadily increasing numbers of people throughout the world. This explosive population growth, resulting in an additional 50 million people each year, produces a continuing flood of new problems. These include such basic questions as the adequacy of food supply—the adequacy of raw materials to meet ever-expanding demands of industrialization—the adequacy of living space, one might almost say "breathing space," for untold millions living in ever more congested areas. Nearer to our interests in this assembly, there are the ever-increasing difficulties of preserving natural regions and landmarks, and the irreplaceable heritages of plant and animal life that they contain.

Two examples, totally different in kind, illustrate the unfavorable consequences of population increase. One is the United States; the other is Africa. As to my own country, the changes that are taking place are now so general that "urban sprawl," as we call it, is no longer a local problem but has become one affecting our entire nation. This unhappy metamorphosis of the landscape is not peculiar to any one region. For instance, much of the Eastern seaboard has already become a sort of extended "Megalopolis" featured by an almost unbroken chain of cities, towns, suburbs, industrial centers and highways. Similar changes are taking place in many regions in the middle West, in the South, and on the Pacific coast. There is no easy solution because the forces at work are so powerful. However, in recent years there is an increasing determination that action must be taken to preserve land for recreational use, and to strengthen the protection given to National and State Parks as well as to forests and wildlife reserves. Only recently several State Governments have voted substantial appropriations for the expansion of parks, and the Federal Government has established the Outdoor Recreation Resources Review Commission, a development of real significance. It is also gratifying to observe the recent widespread concern regarding the effects of the use of pesticides on wildlife and the natural environment. The precipitous programs launched by the Government several years ago involving the use of poisonous chemicals to control pests have now been considerably modified because of the vigorous attacks made by conservation groups.

These developments are distinctly encouraging although, as so often happens in human affairs, corrective action never seems to be taken until it is *almost* too late.

The challenge to the conservationists is to act with the utmost foresight for it is easy to foresee how difficult the task will be in the years ahead. In the case of the United States, it is not unlikely that we shall have *75 million* additional people within the next generation. The same pressures from population increase will be felt throughout the world. It is only too evident that the work of conservationists will become of ever-increasing importance as each year passes.

The situation in Africa, as well as that of a number of Asiatic countries, is of course totally different from that in the United States or, indeed, of any country in the Western world. As far as Africa is concerned, the spread of industrialism is not a factor of particular importance at this time, nor, presumably, will it be for a long time to come. However, the rapid, continuing increase of population in that continent certainly represents a critical threat to the preservation of natural resources and habitats, and especially to the most remarkable fauna existing on any continent on earth.

I discovered while in Africa that one of the great needs for advancing the cause of wildlife protection is additional ecological knowledge. This knowledge can only be gained through the work of skilled people in field research. A certain amount of this has been going on; far more is needed before sound, long-term programs for wildlife preservation and management can be established. This fact emphasizes the necessity for more trained specialists in the various fields of biological knowledge. Wildlife management is a relatively new but increasingly important science.

There are many parts of the world that call for the help of this Union. At this particular time, however, Africa especially is at a stage of crisis and aid is urgently needed now, not later. The Union's influence there, particularly in the protection of wildlife, has an unusual possibility of being effective. There are encouraging signs that some African leaders realize that their continent is enriched by incomparable natural heritages and are prepared to take steps to preserve them. It would be an error to minimize the significance of what is being done spontaneously by certain Africans to establish national parks or game preserves in their countries: for instance, in Ghana, in the Sudan, in Tchad, and in the Meru District of Kenya. Such movements can spread and can be fostered by the encouragement of an international organization such as this Union. Practical steps can be taken, such as helping to educate the African people concerning the values of conservation and assisting them in the advancement of ecological and other field research. Here is an immediate challenge that the Union should be prepared to meet.

The conservationist is inclined to be apprehensive concerning the increase of technology in the physical sciences and the effects of this becoming ever more and

more "a machine age." It must be granted, of course, that the increasing physical capacity to change the face of the landscape through the new extraordinary powers of the machine presents a real danger. However, we need to keep in mind that the power of the machine and other modern technological inventions can be turned to good purpose as far as advancing the cause of natural resources is concerned. As a minor example, I was much impressed while visiting the Amboseli Game Reserve in southern Kenya, to note the good use that machines had been put to in creating new water sources for the use of wild animals. One can imagine the day when, through the advances of technology, the conversion of salt water to fresh may become a practical operation. This development might prove a boon to the cause of conservation. The moral is evident—it is up to the conservationist to use his influence in order that *"technology" may be applied towards the enrichment of nature's resources as well as to the advancement of material and industrial progress.*

The days ahead of us during our assembly here together will unquestionably prove of great value. Through the presentation of technical studies and of the findings of research in the many fields of our common interest, through full discussion, through the comparison of ideas and experiences, we can anticipate that this biennial conference will more than justify the time, travel, thought and energy which, singly and collectively, all of us are dedicating to it. However, the International Union for the Conservation of Nature is designed to be more than a communications-center for those engaged in the various techniques related to conservation. I presume we can all agree that a complementary purpose of the Union, in many respects an even more vital one, is to stimulate action by the public and by governments. Without action knowledge is sterile. While we talk to each other we must also be talking to the world. Conservation is a lost cause unless it becomes an issue of ever-widening meaning to the public at large.

Apropos of this, there now exists a possibility that could prove extraordinarily important. The suggestion has been made that the United Nations, through formal action, by its General Assembly endorse the principle of the protection of natural heritages by the governments of all countries. Such action would evidently prove a stimulus to improved conservation practices in many lands and, among other consequences, would encourage the new leaders of countries that are now gaining independence to play their part in a movement that is one of international significance.

In closing, let us not underestimate the ever-increasing importance of the work and the growing influence of this Union. Let us further hope that each and every one of us here may richly enjoy and profit by our time together. And, above all, may each in his own way contribute to the advancement of the cause that lies so near to the core of human happiness and welfare.

Ten years from now you'll be glad you bought Graf-Apsco

GRAF APSCO CHICAGO USA

THE ORIGINAL "SAFETY FEATURE" MICROSCOPE

$105.30 EACH

In quantities of 5 or more
$117.00 EACH LIST PRICE

Graf-Apsco

Model GB2A

STUDENT MICROSCOPE

MODEL GB2A (WITH CONCAVE MIRROR)

ALL METAL CONSTRUCTION
INDEPENDENT FINE ADJUSTMENT (NOT ONE THAT ACTS ON THE COARSE ADJUSTMENT)
FIRST QUALITY MEDICAL OPTICS
16mm OBJECTIVE (10X) N.A. 0.27
4mm OBJECTIVE (44X) N.A. 0.66
10X HUYGHENIAN OCULAR
ELONGATED BASE TO PROTECT OBJECTIVES
SAFETY MOUNTING OF MIRROR
DISC DIAPHRAGM LIGHT CONTROL

Lower price $117.00

In quantities of 5 or more.....Each 105.30

TRANSPORTATION INCLUDED

Or with substage illuminator instead of mirror.....Same price

THE GRAF-APSCO COMPANY

5868 Broadway **Chicago 40, Ill.**

THE EDITOR'S DESK

The important topic "The Scientists' Role in the Community: New Responsibilities in the Nuclear Age" was the basis of a symposium at the annual Christmas convention of the AAAS in New York. The symposium was introduced and chaired by anthropologist Dr. Margaret Mead.

The large audience heard Dr. Barry Commoner, Dr. Edward Baylor, Dr. Jules Hirsch, Mr. Irving Michelson and Dr. David Barry.

A new organization to discover and encourage future Einsteins and Oppenheimers now in high school was announced by the National Science Teachers Association. Known as the **Future Scientists of America (FSA)**, the organization aims to meet today's need and tomorrow's demand for more scientists by developing a reserve of science potential at the high-school level.

The Dept. of Marine Sciences of the University of Miami is expanding its **summer offerings in oceanography and marine biology.** Courses included are introduction to marine biology, ichthyology, and general oceanography. These courses, carrying college credit, will be offered from June 15 to July 22, 1961. Inquiries should be sent to the Director of Summer Sessions, or to the Chairman, Dept. of Marine Sciences, University of Miami, Coral Gables, Florida.

The world's newest scientific organization, **International Federation of Parasitologists,** is being organized from headquarters at the University of Illinois, as a major step to coordinate efforts toward world health. Prof. Francis J. Kruidenier, University of Illinois zoologist, as secretary of the initial governing commission and executive committee, is key man in organizing the new federation.

Plans have been completed for an experimental deep-sea drilling program beginning in March to test equipment and techniques for possible use in **Project Mohole,** it was announced Dec. 30 by the National Science Foundation and the National Academy of Sciences-National Research Council. The ultimate goal of Project Mohole is to drill through the earth's crust under the ocean to determine the composition and physical properties of the crust and of the underlying rock known as the mantle.

A new journal in radiobiology commenced publication in January. Known as *Radiation Botany,* it will consider for publication articles concerning all aspects of plant radiobiology. The editor-in-chief is Dr. Arnold H. Sparrow.

The Canadian Society of Plant Physiologists now has a category of corresponding membership available at a nominal fee to plant physiologists who live outside Canada. Inquiries should be directed to the Secretary-Treasurer, Dr. D. F. Forward, Dept. of Botany, University of Toronto, Toronto 5, Canada.

Index II for the Journal of Parasitology has been printed. This covers volumes 26-45 (1940-1959) and contains over 16,000 entries, arranged in three divisions: author, subject and host. Orders may be directed to: Dr. W. S. Bailey, Custodian, **American Society of Parasitologists,** Dept. of Pathology and Parasitology, Auburn University, Auburn, Alabama. List price is $7.50.

The **Tennessee Department of Agriculture** announces a new location and requests that all future correspondence be addressed to: Tennessee Department of Agriculture, Division of Plant Industries, Box 9039, Melrose Station, Nashville 4, Tennessee.

The **Audio-Visual Center of Indiana University** now has available a new film bibliography, "Films for Junior and Senior High School Biological and Physical Sciences," containing some 975 listings. Further information may be secured from Circulation Department, Audio-Visual Center, Indiana University, Bloomington.

The **NET Film Service,** Indiana University, has available for purchase or rental a new film series entitled HEREDITY. There are nine 30 minute films, suitable for high school or college biology classes. For information write to NET Film Service, Audio-Visual Center, Indiana University, Bloomington, Indiana.

Titles in the series are: "It Runs in the Family"; "Reproduction and Heredity"; "Sexuality and Variation"; "Mendel's Experiments"; "Many Pairs of Genes"; "Heredity and the Chromosomes"; "The Sex Chromosomes"; "Heredity and Environment"; and "Fact and Fallacy".

Grants

A grant of $446,500, payable over a five-year period, has been awarded to the Department of Biology, **University of Rochester,** by the National Institutes of Health, for research training and graduate study in genetics-cellular biology. It is the first grant of its kind ever received by the department. The program will be under the direction of Dr. Ernst W. Caspari, Chairman of the Department of Biology, and Dr. William B. Muchmore, associate professor.

The National Science Foundation announces that March 1, 1961 is the next *closing date* for receipt of proposals in the **Graduate Laboratory Development Program.** Purpose of the grants is to aid institutions of higher education in modernizing, renovating, or expanding graduate-level basic research laboratories used by staff members and graduate students. Proposals, as well as requests for additional information, should be addressed to: Office of Institutional Programs, National Science Foundation, Washington 25, D. C.

The State University College of Forestry at Syracuse University has received a gift of $25,000 from The Louis Calder Foundation, New York City, for graduate fellowships in pulp and paper technology, according to an announcement by Prof. Fredrick W. O'Neil, chairman of the college's Pulp and Paper Technology Department.

The Soil and Health Foundation in Allentown, Pennsylvania, has awarded **a $4,000 Dental Research Prize to Dr. Albert Schatz,** Chief of the Division of Microbiology at the Philadelphia General Hospital. Dr. Schatz is internationally recognized as the co-discoverer of streptomycin, and is well known to dentistry for his revolutionary "Proteolysis-Chelation Theory of Dental Caries."

Fellowships

A number of graduate assistantships and teaching fellowships are available at **St. John's University,** Jamaica, New York, to qualified graduate students in the areas of biology, chemistry, mathematics, pharmacy and physics, it has been announced by Rev. Joseph E. Hogan, Dean of the Graduate School of Arts and Sciences. Interested applicants are advised to contact St. John's Graduate School before **March 15 for the academic year of 1961–62.**

The Gertrude S. Burlingham scholarship in mycology for advanced predoctoral study at The New York Botanical Garden will be available for

the summer of 1961. The stipend is $700. Work under this appointment may begin at any time after June 1 and should continue for approximately 3 months. Nominations or applications should be sent before April 15 to: The Director, The New York Botanical Garden, New York City 58.

The University of Georgia announces National Defense Graduate Fellowships 1961-62 in Science Education. A stipend of $2000 for the first year of study is offered. Preference is given to first year graduate students who are interested in college or university teaching. For further specific information write to Dr. Charles L. Koelsche, Professor of Science Education, The University of Georgia, Athens, Ga. All credentials of applicants must be submitted by March 1.

Special Institutes

The Mountain Lake Biological Station has available from the National Science Foundation three types of awards for research and study at the Station: Post-Doctorates, for research; Pre-Doctorates, for supervised research; and Post-Graduates, for training in field or laboratory research techniques, thus permitting course work. Application blanks may be secured from the Director, Mountain Lake Biological Station, Department of Biology, University of Virginia, Charlottesville.

Western Reserve University, with the support of the National Science Foundation, will offer a Summer Institute for High School Science and Mathematics Teachers in 1961 for the third consecutive summer. Fifty-three courses will be available in the departments of biology, chemistry, geology and geography, and mathematics. Inquiries should be promptly directed to: Dr. William M. Heston, Department of Chemistry, Room 210 Pierce Hall, Western Reserve University, Cleveland 6, Ohio.

Announcement is made of a recent grant of $31,000 to the Dept. of Biology, **Stephen F. Austin State College,** in Nacogdoches, Texas, by the National Science Foundation for the Department's Second Field Biology Institute for High School Biology Teachers. The 1961 institute program includes work on aquatic invertebrate zoology and plant morphology. Those wishing information about the institute series should write to Dr. E. L. Miller, Director, Second Field Biology Institute, Stephen F. Austin State College, Nacogdoches, Texas.

Notes on Biologists

Dr. R. L. Peterson, Curator of Mammals with the Royal Ontario Museum, went to British Guiana in January 1961 to spend approximately two months working in the Berbice, Pomeroon, Demerarra and Abary River districts. He will be accompanied by Karl Pogany, a biological illustrator at the ROM.

Geneticist **Ray D. Owen** has been appointed acting chairman of the Biology Division of the California Institute of Technology. Dr. Owen is noted for his work in the fields of blood groups and tissue transplantation. He is succeeding Dr. George W. Beadle, Nobel laureate who is leaving Caltech to become chancellor of the University of Chicago.

Dr. Roland R. Renne has been appointed to serve on the National Advisory Council for Health Research Facilities. Dr. Renne is President of Montana State College at Bozeman.

The Darbaker Prize of the Botanical Society of America for meritorious work in the study of algae was awarded to **Dr. Janet R. Stein,** of the Dept. of Botany and Biology, University of British Columbia.

The American Society of Plant Taxonomists George R. Cooley Award for the best taxonomic paper presented at the annual meeting of the Society went to **Mr. Robert Ornduff,** graduate student, University of California (Berkeley) for his paper "Hybridization between *Lasthenia* and *Crockeria* (Compositae): its taxonomic and evolutionary implications."

The appointment of **Dr. Nellie P. Watts** of Boston as instructor of biology at the Boston University College of Liberal Arts has been announced by Pres. Harold C. Case of the University.

Dr. Julius Sendroy, Jr., serves as Chairman of the National Institutes of Health Symposium on Recent Developments in Research Methods and Instrumentation, for 1961.

The following announcements come from the Department of Agronomy at the University of California at Davis. **R. Merton Love,** Chairman of the Department, has recently spent three months on an assignment with the Spanish Government through I. C. A. to study the possibility of intensifying the improvement of lands occupied by native pastures and cultivated forages in the dry and humid zones, and to review at the same time the work done in the field by the Instituto Nacional de Investigacione Agronomicas. **Maurice L. Peterson** and **Frank Parsons** recently attended meetings in Sweden, Germany, Switzerland, France, Denmark and Austria to investigate barriers in the development of foreign markets for small seeded legumes and forage crop seed. The meetings were sponsored by the Foreign Agricultural Service. **Robert W. Allard** has been granted a Guggenheim fellowship to study Stochastic Processes in genetics during a six months sabbatic leave to be spent at Oxford University in the Biometrical Unit with N. T. J. Bailey, beginning February 1, 1961. **William A. Williams** is on sabbatic leave for one year at the University of Adelaide, Adelaide, Australia. He is conducting research on the role of light in the competitive interactions of legumes and non-legumes. **Duane S. Mikkelsen** is on sabbatic leave for one year in Brazil at the request of the IBEC Research Institute. His work will entail both the development of techniques for evaluation of the nutrient status of soils and a study of the primary limiting factors to efficient agricultural production in Brazil.

Dr. G. Robert Coatney, Chief of the Laboratory of Parasite Chemotherapy, National Institutes of Health, has recently returned from Geneva, Switzerland, where he served as Chairman of the Technical Committee on Chemotherapy of Malaria, World Health Organization, which convened on 14-19 November 1960.

Dr. George W. Luttermoser, also of the Laboratory of Parasite Chemotherapy at NIH, has accepted an invitation from the American University of Beirut, Lebanon, Syria, to serve as Visiting Research Professor of Tropical Health in the Schools of Medicine and Public Health for the year 1961.

William P. Shepard, M.D., who is retiring shortly as Chief Medical Director of the Metropolitan Life Insurance Company, has accepted the office of Associate Director of the Institute for Advancement of Medical Communication, a nonprofit organization engaged in developing improved methods for intra- and inter-professional communication in the health sciences.

Charles W. Hart, Jr., has recently been appointed editor of the Association of Southeastern Biologists Bulletin.

Dr. Igor Tamm of the Rockefeller Institute gave an address on "Metabolic Antagonists and Selective Virus Inhibitions" in which he described three groups of substances which are able to inhibit virus multiplication without damaging the host cells.

Dr. H. Stanley Bennett took up his new duties as Dean of the Division of the Biological Sciences of The University of Chicago on January 2. He succeeds Dr. Lowell T. Coggeshall who has been appointed Vice President for Medical Affairs of The University of Chicago.

Dr. Detlev Bronk, President of The Rockefeller Institute, has been elected an honorary member of the Brazilian Academy of Science and has been made an Honorary Doctor of the University of Brazil at a special university convocation. During an extensive trip through Brazil he conferred with hundreds of scientists, government officials, industrialists and publicists on plans for scientific cooperation between Brazil and the United States.

Dr. James F. Bonner, of the California Institute of Technology, has returned from Kuala Lumpur, Malaya, where he addressed the first world-wide conference on rubber.

Under a grant from the National Science Foundation to be administered by the Pacific Science Board **Dr. Egbert H. Walker** will continue to work to complete his *Flora of the Southern Ryukyu Islands*. Specimens and publications pertinent to the Ryukyu area and related regions will be greatly appreciated, either as gifts or loans, and should be addressed to Dr. E. H. Walker, Pacific Vegetation Project, % National Research Council, 2101 Constitution Avenue, NW., Washington 25, D. C., U.S.A.

Edward Anders, associate professor of chemistry at The University of Chicago, is the 32nd recipient of the Newcomb Cleveland $1,000 prize of The American Association for the Advancement of Science. His selection for the award was announced December 26, 1960, at the 127th annual meeting of the AAAS in New York City.

Dr. Maitland Baldwin, Chief of the Surgical Neurology Branch of the National Institute of Neurological Diseases and Blindness since 1953, has been appointed clinical director of the Institute. Before coming to the Institute, Dr. Baldwin was assistant professor of neurological surgery at the University of Colorado.

The December *AIBS Bulletin* erroneously reported an award for outstanding contribution to American botany by the **Botanical Society of America** made to Reed C. Collins. This award was made to Reed C. Rollins, the Society's newly elected Vice Preisdent.

Dr. E. Ruffin Jones, professor of biology at the University of Florida, was named president-elect of the Academy Conference of the American Association for the Advancement of Science at the annual meetings of the group December 26-27, 1960, in New York City.

Meetings

The Biophysical Society held its annual meeting February 16-18, 1961 at the Chase-Plaza Hotel in St. Louis, Missouri. The program included contributed papers on many fields of biophysics, and symposia on Mutations, Membrane Transport and Computational Techniques.

On April 6 and 7, 1961, the **Council on Medical Television** will hold its 3rd annual meeting at the Clinical Center, National Institutes of Health, Bethesda, Md.

The 19th annual meeting of the **Electron Microscope Society of America** will be held August 23-26, 1961 in the Pittsburgh Hilton Hotel at Pittsburgh, Pennsylvania.

As special features of the meeting, three symposia are being planned: (1) "The Ultra Structure of Protein Fibers-Collagen, Muscle, Wool," Rubin Borasky, Chairman; (2) "Contribution of Electron Microscopy to Polymer Morphology," R. G. Scott, Chairman; (3) "Nucleoproteins and/or Nucleic Acids."

The Appalachian Section, Society of American Foresters, held its annual meeting at the Hotel Roanoke, Roanoke, Virginia on February 10 and 11. Eight speakers discussed "Forest Management in Appalachian Hardwoods."

The annual meeting of the **Committee on Biological Handbooks,** Federation of American Societies for Experimental Biology, was held December 2, 1960. The Committee members were informed that the current project, a tabular compilation on "Blood and Other Body Fluids," would be completed early in 1961.

The **Eleventh Annual Southwestern Conference on Diseases in Nature Transmissible to Man** will be held at the Agricultural and Mechanical College of Texas, College Station, Texas, on April 27 and 28, 1961.

The **Wildlife Disease Association** will have its Annual Meeting Sunday, March 5 beginning at 9:00 a.m. in the Pan American Room, Statler-Hilton Hotel, Washington, D. C.

The **North American Wildlife Conference** is meeting March 6, 7 and 8 at the Statler-Hilton Hotel, during which time the **Wildlife Society** will also have a meeting.

The **1961 Temperature Symposium** will be held in Columbus, Ohio, March 27-31. About 200 papers will cover temperature measurements from absolute zero to 10,000,000°K. Interests range from the temperature of the human body to the temperature of the sun. Almost every area of the physical, biological and medical sciences will be represented at the 1961 Symposium on "Temperature, Its Measurement and Control in Science and Industry." Persons interested in the symposium may obtain further information by writing to V. W. Sikora, Instrument Society of America, 313—6th Avenue, Pittsburgh 22, Penn.

The International Association for Dental Research will hold its 39th Annual Meeting March 23-26 at Boston, Mass. Approximately 300 papers will be delivered and several symposia are planned. The program will include such topics as dental caries (both human and animal), properties of enamel and dentin, wound healing, microbiology, nutrition and metabolism, and salivary studies.

International Meetings

XVth International Congress of Limnology will be held at the University of Wisconsin, Madison, Wisconsin, August 20-25, 1962. (Note change of date to avoid AIBS conflict.) The Congress is sponsored in North America by the American Society of Limnology and Oceanography with the cosponsorship of the National Academy of Sciences-National Research Council and the International Society of Theoretical and Applied Limnology. All previous congresses, held triennually, have been in Europe. Inquiries should be addressed to: The XVth International Congress of Limnology, % Dr. John C. Wright, Birge Hall, University of Wisconsin, Madison 6, Wisc.

Sessions on the world's great lakes, latitudinal limnology, decomposition, and problems common to limnology and oceanography are among those planned. Excursions are scheduled for participants to various aquatic areas and research centers of North America. The Executive Committee for the Congress is: Drs. Arthur D. Hasler, Chairman, John C. Wright, Executive Secretary, George H. Lauff, Treasurer, Kenneth D. Carlander, David G. Frey, and Donald S. Rawson.

The Second International Conference of Human Genetics will be held in Rome, Italy, on September 7-12, 1961. Information and registration forms may be obtained from the Secretariat of the Second International Conference of Human Genetics, Instituto "G. Mendel," 5 Piazza Galeno, Rome. The American Society of Human Genetics has been granted funds by the

National Science Foundation and by the U. S. National Institutes of Health for the support of travel of a limited number of the American delegation to the Conference. The Secretary of the American Society of Human Genetics mailed application forms to members of the Society after December 1, 1960. Non-members may obtain forms from Professor C. P. Oliver, Dept. of Zoology, University of Texas, Austin.

From the Societies

The year of the **XVI International Congress of Zoology** was erroneously reported in the December Bulletin as 1961. The Congress will be held in August of 1963.

New officers of the **American Society of Zoologists** are as follows: President-Elect, Professor Curt Stern; Secretary, Dr. Charles B. Metz; Member-at-Large of Executive Committee, Dr. Graham DuShane.

The **American Society of Zoologists** has announced the establishment of its own quarterly—*American Zoologist*. The managing editor is Dr. Sears Crowell, Department of Zoology, Indiana University, Bloomington. The quarterly will be distributed to all members of the Society after payment of dues. Subscription orders from other individuals and from institutions should be addressed to Dr. Crowell.

New Officers

The December issue of the *AIBS Bulletin* reported the new officers for the **Botanical Society of America** in two items (on pages 33 and 34). The announcement on page 33 should have reported John Torrey of Harvard University, not Harvard Unit. The item on page 34 was a duplication which did not include the name of John Torrey.

The American Society of Agronomy elected new officers as follows: President, B. R. Bertramson; vice president, G. W. Burton.

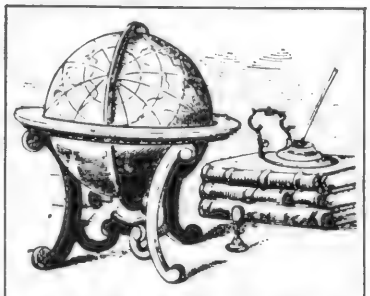
New president of the **Crop Science Society of America** is J. R. Cowan; vice president is R. P. Murphy.

New president of the **Soil Science Society of America** is Werner L. Nelson, midwest manager of the American Potash Institute.

Dr. Frank P. Cullinan, Secretary-Treasurer of AIBS, has been re-elected as President of the Scientific Manpower Commission for another one-year term.

The Entomological Society of America held a meeting in Atlantic City November 28 through December 1, 1960. **M. P. Jones,** USDA extension entomologist, delivered the presidential address, "Selling Insect Control Information." There were 186 submitted papers, 14 symposia and panel discussions, and 19 invited speakers on the program.

The Biological Photographic Association, Inc., presented the Louis Schimdt Award for 1960 to H. Lou Gibson, Eastman Kodak Company, Rochester, N. Y.



AIBS REPORTS

AIBS is pleased to report that the **Biological Sciences Curriculum Study** now has available the Blue, Yellow and Green Text Versions of the BSCS High School Biology and auxiliary laboratory manuals and teacher guides. Also available are the Laboratory Blocks, Student Editions and one volume of Gifted Student Materials. See advertisement on page 8.

For the second consecutive year, AIBS was represented at the **Indian Science Congress,** held January 3-9 at the University of Roorkee, Roorkee, India. President Prasad of India opened the sessions. A large AIBS exhibit, filling nearly 100 feet of wall space in a large room, depicted recent developments in biological education and research. Some 6,650 scientists, students and others visited the display.

The exhibit was designed by the AIBS and constructed in India with the cooperation of the U. S. Information Service. The two biological winners in last year's National Science Fair, **Susan Brown,** 18, of Austin, Texas, and **Gary Botting,** 17, of Peterborough, Ontario, accompanied their prize-winning science fair entries, which were incorporated as integral parts of the overall American exhibit, and proved to be star attractions. AIBS' official representative at the Congress was **Dr. Ralph M. Gerard,** Director of Laboratories for the Mental Health Research Institute at the University of Michigan. Dr. Gerard brought the Congress greetings from American biologists. He also presented a popular evening lecture and delivered papers at technical sessions.

Dr. John R. Olive, deputy executive director of AIBS, gave a popular lecture on his research, and showed one of the AIBS Film Series units at a second general session. **Harold F. Osborne,** director of the Biology News Bureau, managed the exhibit. Elsewhere in India, Dr. Gerard delivered several lectures at universities and research institutes. Dr. Olive lectured at the University of Delhi (and later at the University of Karachi, Pakistan, and in Bangkok, Thailand).

The two teen-agers visited a number of schools and colleges in and near New Delhi, Calcutta and Bombay before returning home. Dr. Gerard also lectured at Silver Jubilee sessions of the National Institute of Science of India. Osborne spoke to a meeting of delegates to the Indian Council for Secondary Education and the Indian Science Teachers Association, showing another AIBS film; and attended ceremonies at which the cornerstone was laid for a new building of the University Grants Commission of India.

Beginning February 1st, **Dr. Fred A. Hitchcock,** distinguished physiologist with The Ohio State University, temporarily joined the AIBS staff as Acting Director of Educational Activities.

ONR Activities

In cooperation with the ONR, the AIBS has completed arrangements with **Dr. Jacques C. Senez,** Centre National De La Recherche Scientifique, Marseille, France, to be **principal speaker** at the **Annual Meeting of the Society of American Bacteriologists.** The meeting will be held in Chicago, Illinois, April 23-27, 1961. The subject of Dr. Senez's speech is "Some Considerations on the Energetics of Bacterial Growth."

Dr. Senez will also participate in the **Symposium on Marine Microbiology** as one of the Section Chairman. The symposium will be held in Chicago, April 20-24, 1961.

Preceding the meetings of the Federation of American Societies for Experimental Biology in Atlantic City, April 10-15, there will be meetings of two **AIBS to ONR Advisory Committees** on **Physiology** and on **Biochemistry.**

Both will meet on Sunday, April

9th to review and evaluate new proposals and currently existing projects on the basis of their scientific merit.

The AIBS Advisory Committee on Biology to ONR met on November 17-18, 1960 at the Windsor Park Hotel, Washington, D. C. Twenty proposals were reviewed and evaluated and in addition four currently existing projects were discussed. **Drs. Eugene Lukacs and Edward Batschelet,** Dept. of Mathematics, Catholic University of America, were among those who participated in the two-day meeting.

The AIBS Shark Research Committee to ONR met in New York City on January 27, 1961.

AEC Activities

The recently established AIBS Advisory Study Committee on Histochemistry and Cytochemistry to AEC held its first meeting in Washington, D. C. on January 30-31, 1961. The primary function of this committee is to assess what application is presently being made of histochemical and cytochemical techniques to radiation effects studies. The committee will advise the Division of Biology & Medicine concerning those areas which appear to be most fruitful and recommend areas which should be strengthened and/or developed.

The committee members are as follows: **Drs. Alex Novikoff, Earl Benditt, Robert W. Mowry, Russell J. Barrnett and Marvin Burstone.**

Placement Service

Employers of Biologists—the **1961 AIBS Placement Service Directory** (Book #1) is currently available to employers of qualified biologists. Cost per copy $1. The publication lists over *150 resumés of the qualifications,* training and experience of biologists seeking positions.

Notice to Biologists—the AIBS Placement Service maintains a year around service. This is one of the many services which AIBS offers to all biologists. Applications are being accepted for listing of resumés in the June 1961 (Book #2) Placement Service Directory. All applications which are received prior to the 12th Annual AIBS Meetings of Biological Societies (August 27-31, 1961, Purdue University, Lafayette, Indiana) will be included in the Placement Service open records for inspection by employers. **For further information** please direct inquiries to the following address: The AIBS Placement Service, 2000 P Street, NW, Washington 6, D.C.

LIBRARY

One copy of each publication submitted for listing should be sent to the Editor, AIBS BULLETIN, American Institute of Biological Sciences, 2000 P Street. NW, Washington 6, D.C. Only books published within a year of receipt will be reviewed. Books marked with a ★ are those published by Bulletin advertisers.

The Structure and Function of Muscle. I. Structure. Ed. G. H. BOURNE. Academic Press, New York and London. 1960.

Already for a long time the need was felt for a presentation of the many new ideas, that have developed in the field of muscle physiology, which would enable those who are not actively participating in this type of research, to get "up to date." Editor and co-workers should be commended for a job very well done in this first volume, which, as its title states, emphasizes structure (macroscopic, microscopic and sub-microscopic). Presentations on biochemistry, pharmacology, regeneration, aging, etc., will appear in the two following volumes. As it is, this first volume covers already an enormous field: gross and microanatomy, histochemistry of, descriptive development, muscle tissue in culture, electron microscopy, molecular basis of structure and contraction, structure and function in invertebrates, motor end-plates, muscle receptors, intercalated discs of cardiac muscle, all are more or less thoroughly discussed by 15 experts in their field, and always with an eye on the function of the muscle. The result is a gratifying compilation of a wealth of information, and what is even far more important: a presentation of stimulating ideas and hypotheses on the physiology of the various types of muscles, in which (ultra) structure plays an important role. The accompanying illustrations are always clear, a number of the (electron) photomicrographs outstanding.

It is of course impossible to give an adequate review of a book like this in the allotted space. Suffice it to say that particularly the chapters on tissue cultures, the molecular basis of contraction, and the intercalated discs were highly interesting to *this* reviewer. How much value to attach to the submicroscopic structures in *fixed* material, as revealed by the electronmicroscope, in relation to function will be debatable for a long time. On reading the book it is forcibly brought home how little is *really* known of the basic processes of contraction and tonus, how much is still hanging in the air. As usual, the "headache muscle," the smooth muscle presents a formidable stumbling block, but at least there are indications of decreasing the gap between this muscle and the striated one. All in all a highly recommendable book, particularly for those who are not in the field themselves. *P. B. van Weel, Department of Zoology, University of Hawaii.*

Selective Toxicity. Second Edition. ADRIEN ALBERT. 233 p., illus. John Wiley & Sons, Inc., New York, N. Y. (1960) $5.50.

The second edition of an earlier study may be considered as a fair measure of growth in the particular field encompassed. In the field of selective toxicity Professor Albert's continuing interest has served to make the second edition a more generic and significantly more comprehensive study than the earlier work which was entitled "Selective Toxicity with Special Reference to Chemotherapy," published in 1951. Comparison of the two works would be justified since the monographic form and satisfying treatment of the original will serve many of us as a base for comparative purposes. Larger in format, approximately 6" x 9", the present edition is more broadly applicable in the field of chemistry associated with biological systems. The new, cleaner title should serve to attract biological chemists other than those specializing in chemotherapy. Many examples of modes of application and studies in the field of agricultural fungicides, insecticides, herbicides, parasitology, marine organisms, and bacteriology in addition to those in pharmacology and medicine are provided. Against these subject areas the principles of biophysical and molecular chemistry, including absorption, distribution and excretion pharmacodynamics, chemical structure and biological activity, metal binding, surface chemistry and steoisomerism are coordinated. The broad approach creates an excellent source for comparative studies and the biochemist, enzymologist, nutritionist and physical chemist will find much to give his own specialty a sharp perspective.

With a bibliography updated through 1959 and enlarged by approximately 80% more titles than the Edition 1, *Selective Toxicity* has more firmly than ever fixed its position as a keystone in this fascinating field of chemical-biological relationship.

The highly useful and well organized index, approaching a thousand entries is admirably substantive, and although strongly oriented toward chemical compound names, does not neglect the needs of specialists in physiology, epidemiology, clinical practice and several other fields in applied biology.

The warm respect for history artistically folded into the chapters of this book make one regret that an entirely new preface was not prepared for the second edition, since the motivation for the revision and growth of *Selective Toxicity* deserves, too, a small niche in biochemical history. *Walter M. Bejuki, Prevention of Deterioration Center, National Academy of Sciences, National Research Council.*

Forest and Shade Tree Entomology. ROGER F. ANDERSON. vii + 428 p. 4 plate drawings, 131 black and white photographic plates. John Wiley and Sons, Inc., New York & London (1960) $8.50.

This "guide to the scientific understanding of the identification and control" of insects which are reported as causing four times as much forest and shade tree mortality throughout the United States and Canada, as does fire, and twice as much as does disease, is a timely contribution to a field of interest in which all too little has previously been published. It should be welcomed by those responsibe for protecting this, one of our most important natural resources. It could serve as an excellent text book, but is particularly valuable in that it provides a means of easily identifying pest species in the field from appearance and from the type of injury.

The subject matter is well arranged and cross-indexed for easy reference with a separate list of the more common hosts of the pest species cited. The first of its two major sections deals with insect biology and ecology in its broader aspects, including identification with a key to the recognized Orders. The importance of silvaculture as the first step in control is discussed with stress also placed on climatic and biological factors. Chemical control, as it concerns available materials and their formulation and application, is effectively generalized and later covered in more detail with respect to numerous individual pest species. The second section groups pest species attacking forest and shade trees according to feeding habits, as de-foliators, wood borers, sap-suckers, root feeders, bud, twig and seedling damagers, and cone and seed detroyers. Both as groups and as individual species they are discussed with respect to their hosts, range, general appearance, type of injury, life cycle, and control, in that order. 48 simple Keys permit easy identification of pest species in the field from readily discernible taxonomic characters or from observable typical injury resulting from their attack. The Key factors are graphically illustrated using 312 black and white photographs.

The author, currently Professor of Entomology in the School of Forestry, Duke University, is well qualified by academic training and by extensive research in many areas across the country, to present the subject, with an obvious ability to transmit his knowledge to the reader using a minimum of words. He has drawn freely on the published work of others in this field with proper credit through extensive selected bibliographical references. This book is recommended without reservation to all trained and lay workers and students in both forestry and entomology. *H. M. Armitage, Retired Chief, Bureau of Entomology, California Department of Agriculture.*

Cold Injury. Transactions of the Sixth Conference. STEVEN M. HORVATH, Editor. 375 p., illus. Josiah Macy, Jr., Foundation, New York, N. Y. (1960) $6.50.

This volume follows the pattern established by its predecessors as verbatim reports of the Macy Conferences. What start out as formal papers on various aspects of the main topic rapidly become informal questions and answer sessions.

The title of the conference gives but a limited clue to the contents, which for the most part deal with adaptations of the organism to cold, rather than injury in the limited sense. Topics range in nature from laboratory studies on man and other species to anecdotal accounts of experiences in cold environments. Among the former are investigations on the role of the sympathetic system in maintenance of the homothermic state (Keller); some aspects of hibernation (Lyman); non-shivering thermogenesis (Davis and Hart); an a mostly theoretical consideration on the heat loss problem in wind chill (Molnar). Field studies on men living in extremely cold environments constitute the remainder of the presentations. These include investigations on energy balance and activity of heat conservation and production mechanisms (Henschel, Bass and Irving); a wide survey of physiological and biochemical parameters as they are affected by cold (Pace), as well as similar studies on combat infantrymen; and a variety of clinical observations (Siple and Taylor).

A wealth of material is here for the interested reader who has the patience to wade through the rather disorganized questions and comments which form a major part of each chapter. The general lack of organization takes this book from the class of a text or reference for the beginner in the field. Rather, it is for the expert who knows what he is looking for and can interpret what he finds. *R. R. Sonnenschein, Department of Physiology, University of California, Los Angeles.*

Bird Portraits in Color. T. S. ROBERTS. University of Minnesota Press, Minneapolis. (1960) $5.95.

As a book of bird pictures this volume, on the whole, is very attractive. The plates are taken from Roberts' *Birds of Minnesota*, now out of print, and represent the work of W. J. Breckenridge, Allan Brooks, L. A. Fuertes, F. L. Jacques, G. M. Sutton, and W. A. Weber. Some of the paintings represent the best work of these artists. I particularly enjoy the Prairie Chicken of Jacques and Brooks' Ruby-throated Hummingbird, both of which seem especially well executed by these artists in their own distinct styles, and which do not suffer from the crowding that is so characteristic of illustrations for books on birds. The quality of the paintings, however, is not uniform throughout the book, and some fall far below the standards set by these two plates.

The text which accompanies the plates serves as a brief introduction to the major families represented in the North American avifauna, and presents a brief statement of the geographical distribution, size, and usually something of song, field marks, and habits of the species shown in the plates. These species accounts were written by Roberts for the 1934 edition of the book, with minor changes and corrections by the editors of the present edition. Too often the descriptions of song and behavior are written in the florid, romantic style which was common in many bird books of thirty years ago. The poetic style is perhaps not out of place in a book of paintings, but to attribute man-like emotional states to birds has been shown by studies of bird behavior to be unwarranted, and it is unfortunate that lapses of this sort are so frequent in the book. A more complete revision of the new edition would have made the

text much more acceptable to the serious bird sudent. *William Lay Thompson, Department of Biology, Wayne State University, Detroit 2, Michigan.*

The Chemistry and Biology of Sialic Acids and Related Substances. A. GOTTSCHALK. 128 p.; illus. Cambridge University Press, New York, N. Y. (1960) $4.00.

This well written monograph presents a lucid account of researchers on sialic acids. Since the author has been active in the field for several years and is one of the major contributors he writes with the insight derived from intimate first hand experience. Virtually every paper in the literature which touches upon the sialic acids is listed in the bibliography although more recent findings have not been treated too fully. This book is especially valuable in that it clarifies the tangled early history of these compounds when ideas were rapidly changing.

The author begins with a historical section on the development of knowledge of mucoproteins and mucopolysaccharides. Subsequent chapters deal with chemistry and assay methods. A particularly full account is given of the chemical basis of the Ehrlich assay. Other chapters deal with linkage of sialic acids to macromolecules, biological activity of sialic acid-containing materials, presence of sialic acid in tissues, and enzymes acting upon sialic acids. The book ends on a rather speculative note with a discussion of muramic acid. Although it is tempting to associate the backbone of the sialic acids — neuraminic acid — with muramic acid there is little solid evidence to substantiate this thesis. *Leonard Warren, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health.*

Cytology and Evolution. E. N. WILLMER. 430 p.; illus. Academic Press, New York, N. Y. (1960) $10.00.

This is a highly original book. So many books and papers with similar titles suggest that chromosomes and cytology are synonomous, and that other aspects of cytology can be disregarded in evolutionary studies. Here, attention is concentrated upon cellular differentiation. The book stems from years of study of cell differentiation in mammalian tissue culture. Willmer finds that these cells comprise three types, mechanocytes, epitheliocytes, and amoebocytes. To explain this, he looks to their phylogenetic source. He considers that the primitive metazoan embryo was probably similar to that of the calcareous sponges of today. Upon examining the latter cytologically, he finds two predominant cell types, both of which may form epithelia: flagellated cells (mechanoblastic) and amoeboid cells. These cells have opposite (complementary) properties with respect to fluid and salt balance, and they are concentrated at opposite poles of the embryo, with a gradient between. Evidence of such ambivalence is also found in the rhizopod protozoan *Naegleria*, and it is suggested that the Metazoa may have originated from such a protozoan by a "symbiosis of opposite types" of cells. Such symbioses are then followed through the phylogenies of certain organs, such as the excretory organs.

The most serious defect in Willmer's thesis is his dependence upon the sponge embryo, and this in spite of his agreement that "it is probable that the sponges are an off-shoot from the main evolutionary tree." He emphasizes the superficial similarity of the blastulae of sponges and of other phyla without even mentioning those many aspects of sponge embryology, such as inversion of layers, which tend to discredit any supposed homologies. He could probably have strengthened his argument by drawing his basic materials from the embryology of some other primitive metazoan—a coelenterate, a mesozoan, or a flat worm.

This is a highly stimulating book. It should be widely read by students of cytology and evolution, and it may well suggest some very productive avenues or research. *Edward O. Dodson, University of Ottawa, Canada.*

Principles of Genetics. ELDON J. GARDNER. 366 p., illus. John Wiley and Sons, Inc., New York. (1960) $7.50.

"This book is written primarily for the college student taking his first course in genetics. It emphasizes basic principles and tells the story of the classical experiments which have laid the foundation for a modern science. Hereditary material or germ plasm is considered in its cytological and biochemical setting along with the mechanics of transmission genetics [the explanation of which is greatly facilitated by a considerable number of original schematic diagrams]. Because genetics is usually encountered in terms of a problem, the problem approach is used in discussions as well as in the learning exercises at the ends of the chapters."

Principles of Genetics is also the title of another similar, though somewhat more advanced, textbook. Suffice it to say that this one does suffer by comparison with the one by Sinnott, Dunn, and Dobzhansky. However, the most attractive feature of what will prove a useful book for undergraduates is the *generous* manner in which it is illustrated. The reviewer's italics may be validated by considering the following: incorporated into the text at various points are a series of eighteen sketches, drawn by E. Thorpe, of leading geneticists (all deceased). The sketches of Lamarck, Mendel, Bateson, Johannsen, Boveri, Nilsson-Ehle, Emerson, Wilson, Morgan, Bridges, Goldschmidt, de Vries, Stadler, Galton, Darwin, Shull, Spillman, and Vavilov are each captioned with the nationality and major contribution of the scientist depicted. Only Goldschmidt's nationality is omitted. Some of these drawings are indeed good; they are listed here in the order in which they occur in this book, indicating the sequence of topics under examination.

An index is clearly important in any reference work; it is most important in a textbook. In the book under review the index is not as accurate as it should be. For example, under the heading "Hybrid sterility" only one page is listed—one where the relationship between polyploidy and the difficulties encountered in interspecific crosses is inspected. Yet, at least pages 204, 206, 329, and 330 should have been referred to.

A final comment: illustrative material and assistance provided by the National Pigeon Association has been put to good use. *Lee Ehrman, Department of Zoology, Columbia University.*

Quantitative Zoology. GEORGE GAYLORD SIMPSON, ANNE ROE and RICHARD C. LEWONTIN. Revised edition. viix 440 pp. Harcourt, Brace and Company, New York, N. Y. (1960) $8.00.

The first edition of this book, published in 1939 by McGraw-Hill Book Company, soon became a much desired collector's item. The biological literature since that time contains many references to analytical procedures discussed in the first edition. Since 1939 enormous progress has been made in methods for the interpretation of analytical data; however, many biologists were unaware of these advances and continued to use the first edition of this book as a source of analytical methods for the interpretation of zoological data.

The revised edition has been almost completely rewritten and includes an excellent presentation of modern statistical methods. However, non-parametric procedures are not discussed. I have read the book very carefully and have developed unlimited admiration for the authors who have succeeded in preparing a book on analytical procedures that I believe will

be acceptable to the zoologist and statistician. The book is a joy to read. It was obviously written by persons with an insight into zoological and statistical problems.

It is difficult and probably useless for a reviewer to discuss chapter by chapter the material included in such a book. It is impossible to place on paper my enthusiasm for each and every chapter; therefore, I can only recommend strongly that all research zoologists and biostatisticians consulting with zoologists read it. In my opinion the book is neither a textbook nor a reference for all quantitative procedures. Rather it is a book to be read for enjoyment and to gain an insight into the interpretation of zoological data. In addition to the standard chapters one finds in most statistical texts, the reader will find a chapter on growth and another on graphic methods.

In general, the presentation omits mathematical proofs and references to many well-presented comments on statistical concepts; however, I would not consider this a weakness. The zoologist should be cautioned against considering this a cookbook of statistical procedures.

Vincent Schultz, Environmental Sciences Branch, Division of Biology and Medicine, U. S. Atomic Energy Commission.

★Laboratory Manual for Botany. CHARLES LAMOTTE, ROBERT B. STEWART, and NORMAN D. FLADOS. 72 p. Burgess Publishing Co., Minneapolis, Minn. (1960) $2.75.

General botany instructors who are looking for a laboratory manual with new and different organization, approaches, experiments and exercises will not be interested in this one. However, instructors offering a one-semester course in botany with a traditional laboratory may prefer this manual to others available, particularly if they want the students to make all their own drawings. In contrast with many current manuals, there is not a single illustration in this one.

The manual seems to be well organized and the typewritten pages reproduced by offset have a neat and uncluttered appearance. The pages are spirally bound and punched for a three-ring notebook, so that the student can place the report pages in his notebook after they have been turned in for checking. In general, the manual may be described as a stripped-down compact model, providing just about the minimum material that anyone would want to include in a college botany course. It should be possible to complete all 16 exercises in a semester without rushing, and even the least affluent college should be able to provide the materials and equipment needed. There is no excess verbiage, but the instructions are mostly reasonably complete and adequate.

There are 9 chapters or exercises dealing with morphology, anatomy or cytology, 3 on physiology, 3 on a survey of the plant kingdom, and 1 on genetics. While the instructions appear to be quite free from obscurities and inaccuracies, the terminology and definitions relating to diffusion and osmosis leave something to be desired. The choice of experiments is not always the best that might have been made, though most of those included should work quite well in the hands of students. — *V. A. Greulach, Department of Botany, University of North Carolina.*

★Plant Disease Handbook. CYNTHIA WESTCOTT. 2nd Revised Edition. 800 p. Van Nostrand, New York, N.Y. (1960) $13.50.

Cynthia Westcott has done it again! She has revised and improved one of the basic reference works on the art of plant pathology. Plant pathology like medicine comprises both a science and an art. Plant pathology deals with the comparative science of the diseased and healthy plant on the one hand and with the art of diagnosis and treatment of the diseased plant on the other.

Cynthia's book deals with the latter. She deals with the art. Her book is a book that cannot be ignored by those who must deal with the art of plant pathology — extension men, tree experts, chemical companies and the like.

Cynthia Westcott is an unusual person in an unusual field. On that account she is the only plant pathologist, perhaps the only botanist to rate a "Profile" in the *New Yorker*. A graduate of Wellesley and Cornell, she entered alone and mastered alone the art of success as a consulting plant pathologist as a paying business, not as a public servant. Her books must be good to sell. She can command no captive audience of university colleagues.

Her books on practical plant pathology do well. She is to be congratulated on another superior job of providing a "doctor book" for those who diagnose and treat the sick plant.— *James G. Horsfall, The Connecticut Agricultural Experiment Station, New Haven.*

A MANUAL OF COMMON BEETLES OF EASTERN NORTH AMERICA

Elizabeth S. Dillon and Lawrence S. Dillon
Agricultural and Mechanical College of Texas

NEW. Published January 1, 1961. This comprehensive, liberally illustrated identification manual includes nearly 1,200 species of beetles in the 64 most common families. The species covered by this manual are the commonly found varieties making up 90 per cent of the beetles likely to be encountered in Eastern North America. Illustrations include 1,160 species in black and white, 17 species in full color, 37 line drawings of larvae, and 544 text figures.

Keys to the families enable the naturalist to identify specimens quickly. The text proper includes a full description of each family, genus, and species, with complete identification keys to categories.

The structure, habits, and ecology of beetles are described in detail, and complete instructions are given for collecting, killing, preserving, pinning, and labeling.

A glossary explains technical and scientific terminology. An extensive bibliography is arranged both by states and alphabetically by family.

896 pp. $9.25

NITROGEN METABOLISM IN PLANTS

George C. Webster
The Ohio State University

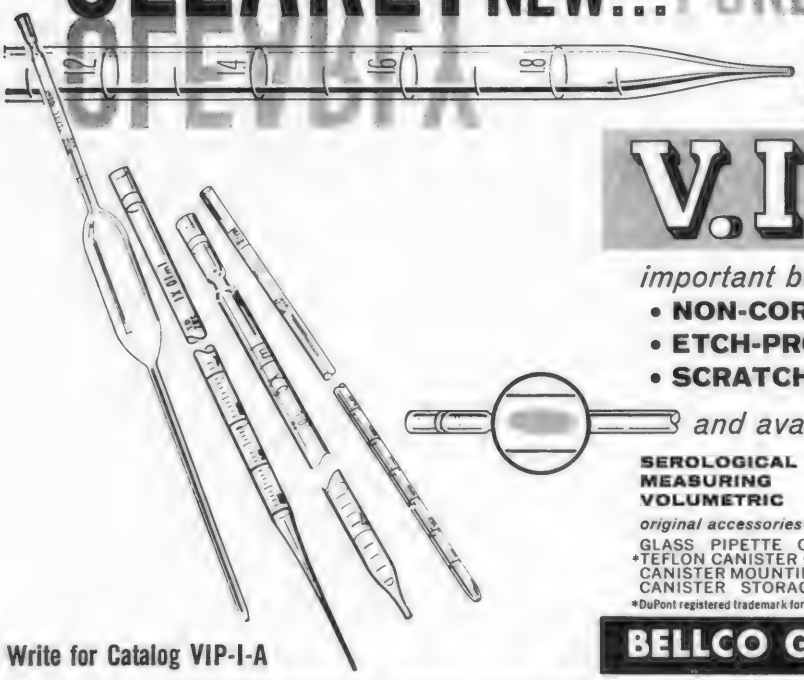
"This is an excellent pocket-size paperback book, with chapters on amino acid metabolism, biosynthesis of amides and peptides, protein and nucleic acid metabolism, and nitrogen metabolism in the intact plant. Advances with other organisms, from bacteria to animals, are given ample due, although higher plants never leave the center of the stage. This unpretentious book can be heartily recommended to botanists staggering under the burden of costly gigantic 'handbooks' of plant physiology and biochemistry doomed to speedy obsolescence and penetrable only with concentrated prolonged study.

"The reviewer hopes that this venture will be well supported, so that more of these handy (not 'hand'l) books will be published and in large enough printings to permit low cost." — from review by S. H. Hutner, Haskins Laboratories, in May-June, 1960, issue of *The Garden Journal* of the New York Botanical Garden.

160 pp. $3.50

ROW, PETERSON & CO.
Evanston, Ill. Elmsford, N. Y.

CLEARLY NEW... PURELY Bellco



V.I.P.

Very Important Pipettes
for
Very Important People

important because they're:

- **NON-CORROSIVE** *Borosilicate Glass*
- **ETCH-PROOF** *Will Never Cloud*
- **SCRATCH RESISTANT**

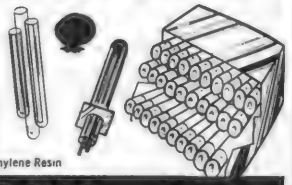
and available **COLOR CODED**

SEROLOGICAL
MEASURING
VOLUMETRIC

original accessories too!

GLASS PIPETTE CANISTERS
*TEFLON CANISTER CUSHIONS
CANISTER MOUNTING PLATES
CANISTER STORAGE RACKS

*DuPont registered trademark for Polytetrafluoroethylene Resin



Write for Catalog VIP-I-A

BELLCO GLASS INC. VINELAND, N.J.

Ready in March

General Biology, Rev. Ed.

Willis H. Johnson, Richard A. Laubengayer, Louis E. DeLanney, *all of Wabash College*

Major revisions in this popular text involve the sections dealing with (1) photosynthesis, (2) muscle contraction, (3) nature of the genetic material and gene action, (4) population genetics, and (5) the origin of life. Two new chapters have been added: (1) a chapter on vertebrate classification and phylogeny; (2) a chapter on cell function and ultrastructure. Recent developments in molecular biology and electron microscopy are introduced. Many new illustrations have been added. (1961, 620 pp., $7.50 tentative)

Ready in April—by the same authors

Laboratory Manual in General Biology, Rev. Ed.

Designed to accompany the authors' text. (1961, 160 pp., $3.50 tentative, paper)

Ready in Spring 1961—the first 4 Titles of a New Series

Biology Studies

- **COMPARATIVE PLANT ANATOMY**

  Sherwin Carlquist, *Claremont Graduate School* (1961, 160 pp., $4.00 tentative)

- **TRANSLOCATION OF SOLUTES IN PLANTS**

  A. S. Crafts, *University of California at Davis* (1961, 208 pp., $5.00 tentative)

- **GROWTH AND REGULATION OF ANIMAL POPULATIONS**

  Lawrence B. Slobodkin, *University of Michigan* (1961, 224 pp., $5.25 tentative)

- **GENES, ENZYMES, AND INHERITED DISEASES**

  H. Eldon Sutton, *University of Texas* (1961, 160 pp., $4.00 tentative)

Holt, Rinehart and Winston, Inc. 383 Madison Ave. N. Y. 17

Outstanding RONALD Books . . .

LABORATORY STUDIES IN GENERAL BOTANY

WILLIAM M. CARLTON, *University of Georgia*

Ready in March. Thoroughly class-tested, this new manual provides a sequence of 51 basic exercises for laboratory work in the first course in botany. Each exercise constitutes a complete unit of study and is carefully keyed to the relevant material in Northen's *Introductory Plant Science*, 2nd Edition, as well as other widely used textbooks in general botany.

Clearly outlined experiments and a wealth of illustrations introduce the beginning student to each of the various aspects of plant science. Throughout, the book emphasizes questions which stimulate thought and reasoning. Summary questions testing comprehension of material, illustrations for the student to identify and label, and tables for recording data have been placed at the end of each exercise so that they may be removed without disturbing the body of the text. All pages are perforated and punched for three-ring binder. *1961. 416 pp., 309 ills. Paper cover.* $4.50

INTRODUCTORY PLANT SCIENCE

HENRY T. NORTHEN, *University of Wyoming*

This highly praised introductory textbook relates the science of plants to their importance to man. Incorporating many developments in plant physiology, it includes the results of radioisotope experiments in photosynthesis and the salient features of new growth substances such as gibberellic acid. Special sections emphasize life cycles; reproductive processes and their biological significance; the value of groups of organisms to plants, animals, and man. Further aids to teaching include line drawings, end-of-chapter questions, and a glossary. *"Northen has accomplished the difficult feat of combining accuracy with readability."*—Walter H. Muller, *Santa Barbara College. 2nd Ed., 1958. 718 pp.; 438 ills., tables.* $7.25

PRINCIPLES OF PALEOBOTANY

WILLIAM C. DARRAH, *Gettysburg College*

Second Edition. This book presents the conceptual scheme of paleobotany through the explanation and use of the assumptions and techniques employed in the interpretation of the fossil record. The treatment develops a balanced presentation of the geological history of the plant kingdom. Each chapter includes brief descriptions of significant forms, geological and geographical occurrences of these forms, and outlines of classifications. The major groups of plants with fossil representatives are considered in chronologic and taxonomic sequence. Each group is defined, and the basic discoveries relating fossil forms to these groups are introduced. *A Chronica Botanica Publication. 2nd Ed., 1960. 295 pp.; 75 ills., tables.* $6.50

The Sixth Annual Symposium Publication of the Society of General Physiologists—

MACROMOLECULAR COMPLEXES

Edited by M. V. Edds, Jr., *Brown University*

Just Published. The studies presented in this volume are representative of recent efforts to analyze complex macromolecular aggregates, to investigate the origin, interaction, and spatial disposition of their components, and to assess the respective roles of each constituent in the properties of the whole. 14 prominent investigators present evidence supporting the assertion that large molecules of diverse types are assembled in rigorously patterned arrays, from which it is assumed that many of the structural and functional properties of the living system depend critically on the distribution of matter and energy in these arrays. *1961. 269 pp., 107 ills.* $7

Other S. G. P. Symposia—

SUBCELLULAR PARTICLES, Teru Hayashi, *Editor, with 20 Contributors. 1959. 213 pp.; 122 ills., tables* $7

PHYSIOLOGICAL ADAPTATION, C. Ladd Prosser, *Editor, with 14 Contributors. 1958. 185 pp.; 90 ills., tables.* $4

INFLUENCE of TEMPERATURE on BIOLOGICAL SYSTEMS, Frank H. Johnson, *Editor, with 24 Contributors. 1957. 275 pp.; 133 ills., tables.* $4.50

PHYSIOLOGICAL TRIGGERS and Discontinuous Rate Processes, Theodore H. Bullock, *Editor, with 16 Contributors. 1957. 179 pp.; 55 ills., tables.* $4

ELECTROLYTES in BIOLOGICAL SYSTEMS, Abraham M. Shanes, *Editor, with 11 Contributors. 1955. 243 pp.; 123 ills., tables.* $4

The Eighteenth Symposium of the Society for the Study of Development and Growth—

DEVELOPING CELL SYSTEMS and THEIR CONTROL

Edited by Dorothea Rudnick
Albertus Magnus College and Yale University

Recent advances in the knowledge of cell differentiation and its control within the organism, presented from both the biological and biochemical points of view. Ten internationally known contributors discuss a diversity of organisms in the plant, animal, and microbiological kingdoms on the basis of their original studies of: the cellular aspects of organization; pathways of hormone action on responding cellular systems; chemical control of regeneration of the nervous system in Amphibia; etc. *1960. 240 pp., 126 ills.* $8

The 16th and 17th Symposia of the Society for the Study of Development and Growth—

DEVELOPMENTAL CYTOLOGY, Dorothea Rudnick, *Editor, with 10 Contributors. 1959. 215 pp.; 118 ills., tables.* $8

CELL, ORGANISM, and MILIEU, Dorothea Rudnick, *Editor, with 12 Contributors. 1959. 326 pp.; 136 ills., tables.* $8

Publishers of CHRONICA BOTANICA BOOKS

Including: Chronica Botanica New Series of Plant Science Books — Chronica Botanica: An International Biological and Agricultural Series

THE RONALD PRESS COMPANY • 15 East 26th St., New York 10

No. 2800

$47.50

Request bulletin 60GB
Describing all cabinets

Eberbach Expandable Unit System Cabinets Hold 500 Slides Flat

The popular Eberbach Unit System filing cabinets hold 500 3" x 1" slides flat in separate compartments. The filing cabinets are built with flat sides and top to facilitate "stacking" as the need for additional filing capacity arises. The 25 numbered aluminum drawers each hold 20 slides in separate compartments. The durably finished oak cabinets have a disappearing door and measure 8½" x 10" x 12" deep.

Eberbach
CORPORATION
P.O. Box 1024, Ann Arbor, Michigan

TO BE PUBLISHED IN MARCH...

Laboratory Guide for Biology

By ALFRED M. ELLIOTT, University of Michigan

Intended for general biology courses, this new laboratory manual employs the theory of evolution as the unifying theme for the study of plant and animal life. Outstanding features are the inclusion of original drawings made from dissections and microscopic material and the use of sufficiently detailed instructions to allow the student to work with a minimum of assistance.

The major divisions of the manual include:

I—Biology as a Science
II—Life: Its Beginning and Nature
III—The Organized Individual
IV—Classification of Organisms
V—The Rise of Plant Life
VI—A Typical Seed Plant
VII—The Rise of Animal Life
VIII—The Organ Systems of a Vertebrate
IX—Continuity of Life

8½ x 11 320 pages illustrated

The laboratory manual is organized to accompany:

BIOLOGY

By Alfred M. Elliott and Charles Ray, Jr.

Published last spring, this introductory text achieves an even balance between traditional descriptive biology and the presentation of the newer elements in biochemistry and biophysics. As in the manual, the theme of evolution underlies the entire book. Exceptionally good coverage is given to botany, which is presented from the viewpoint of a botanist with a feeling for the material, methods, and aims of the science. Hundreds of excellent line drawings and photographs have been prepared under the direction of the authors and are carefully integrated with the text.

736 pages 490 illustrations $8.00

Appleton-Century-Crofts, Inc.
35 West 32nd Street, New York 1, N. Y.

Important new books from

McGraw-Hill . . . . .

FUNDAMENTAL PRINCIPLES OF BACTERIOLOGY, Fifth Edition

By A. J. Salle, University of California, Los Angeles. Ready in January, 1961. 824 pages, $11.00.

A thorough revision of our most rigorous and comprehensive general bacteriology textbook. This text is designed for the student who wants a thorough grounding in the essentials of bacteriology and who intends to proceed into more advanced work in bacteriology or microbiology. This revision incorporates the latest thinking and developments in the field. Lab manual available.

REPRESENTATIVE CHORDATES, *Second Edition*

By Charles K. Weichert, University of Cincinnati. *The McGraw-Hill Series in the Zoological Sciences.* 232 pages. $4.25.

A laboratory manual designed especially for one-semester courses in Comparative Anatomy of the Vertebrates. The manual describes in detail the anatomy of four representative chordates: the marine lamprey, the spiny dogfish, the mud puppy, and the cat. Numerous illustrations of the animals and structures to be studied are included along with information concerning the natural history and the functional role of the organ systems wherever feasible.

MORPHOLOGY OF ANGIOSPERMS

By Arthur J. Eames, Cornell University. *The McGraw-Hill Series in the Botanical Sciences.* Ready in February, 1961.

A long-awaited companion volume to MORPHOLOGY OF THE VASCULAR PLANTS outlining the prominent advances in information and interpretation of the angiosperm morphology—covering habit, flower, embryo, wood, etc.—that have been made in the past few decades. A text and reference for the upper level and graduate student studying the flowering plant.

HANDBOOK OF HISTOLOGY

By Karl A. Stiles. With an Introduction by Melvin H. Knisely. Fourth Edition. 240 pages, $3.00.

This is the fourth edition of the widely used handbook for histology courses. In outline form, this book is useful as a laboratory manual, a syllabus with lectures, a basis for review, an aid to students preparing for quizzes or boards, and as a short text to be used as the basis of reading in the big standard books. Comprehensive glossary included.

TEXTBOOK OF HISTOLOGY, *Third Edition*

By William W. Windle, National Institute of Health, 582 pages, $10.95.

A basic, undergraduate text designed for the liberal arts and beginning students encountering mammalian histology for the first time. The fundamental facts on the finer structure of the body are presented with an emphasis on their functional aspects. The basic chapters have been revised to include the latest advancements in fine-structure histology. Of particular interest in this edition are the color plates and many electron micrographs of exceptionally high quality.

THE HUMAN ORGANISM

By Russell M. Decoursey, University of Connecticut. 672 pages, $7.50.

Designed to acquaint students with an essential, basic knowledge of their own anatomy and physiology. It is written with the liberal arts student in mind, the general student and the pre-professional. This second edition has been carefully up-dated to include the results of recent research in physiology and biochemistry.

THE SCIENCE OF BIOLOGY

By Paul B. Weisz, Brown University, 819 pages, $7.95.

This integrated "principles" text for introductory courses in biology, zoology, and botany began as a revision of the author's highly successful BIOLOGY. Since the revised text is much broader in scope, and very different from its predecessor, it is being published as a new book rather than a revision. This new book should be the answer to the urgent need for a workable "principles" text. To accommodate existing courses, the organization of the text has been made very flexible, thus facilitating a wide variety of course presentations. It features 620 outstanding functional illustrations. Laboratory Manual and Instructor's Manual are available.

FUNCTIONAL ANATOMY:: MAMMALIAN AND COMPARATIVE, *Third Ed.*

By W. James Leach, Ohio State University. *McGraw-Hill Series in the Zoological Sciences.* Ready in March, 1961.

ELEMENTS OF ZOOLOGY, *Second Ed.*

By Tracy I. Storer, University of California, Davis; and Robert L. Usinger, University of California, Berkeley. Ready in March, 1961.

Send for copies on approval

McGraw-Hill Book Company, Inc. 330 West 42nd Street New York 36, New York

ANNOUNCING . . .

A BIBLIOGRAPHY OF

EASTERN ASIATIC BOTANY

SUPPLEMENT 1

東亜植物文献目録—増補 I

(Tung a chih wu wên hsien mu lu—Pu i I)
(Tô-a shokubutsu bunken mokuroku—Zôho I)

By

EGBERT H. WALKER**

This volume published by the AIBS with support from the N.S.F., **contains over 11,000 entries** occupying **414 pages**, covering the botanical literature of Japan, China, Taiwan, Korea, Manchuria, Mongolia, Tibet, Eastern Siberia and the Far East. It **extends through 1958** the coverage of the original bibliography, which closed with 1936. Thus it includes the scientific publications from China, Japan and western countries during the disturbed period of the late '30's and the war years. In addition the **extensive Russian literature** on Soviet eastern Asia is included.

As in the original volume the term "botany" is broadly interpreted to cover most publications dealing with the plants of this area: **systematic botany, vegetation, phytogeography, ecology, economic botany, medicine botany, plant pathology, historical botany, plant exploration,** etc. The plant kingdom is covered from the **bacteria** and **Myxophyta to the Composite family.**

The original bibliography is an **essential reference work** in a wide range of investigations, and has become a model for preparing similar works. It is the **most extensive regional bibliography ever published** and is "considered by some as the **most important contribution** to **eastern Asiatic botany** ever made."* Among the many extensive users of this volume and its Supplement, in addition to students of the above subjects, are **mycologists, horticulturists, pharmacologists, librarians, anthropologists,** and **ethnologists.**

This work is in English, but the Supplement **includes** the **original Chinese, Japanese** and **Korean titles** as published in **oriental characters,** as well as **translations of these titles.** All **Russian titles** are **transliterated** into **Roman letters** and are also translated. The Chinese and Japanese **characters** for all **oriental authors** are added.

The **needs** of the **user** have been carefully **considered** in preparing this work. **Each entry bears an annotation** giving supplementary data, and in some cases cross references. The extensive and detailed **subject index** is the **most important accessory** to the **list of authors and titles** comprising the bulk of this work. **Librarians** especially will find the **reference list** of over 800 serial **abbreviations** a valuable tool. For many **serial titles** of oriental authors will be valuable aids to many workers in locating these listed publications. A **new map of Japan** shows both provinces and prefectures.

**From Flora Malesiana Bulletin, August 1, 1960.*

xi + 552 pages/Subject Index/2 maps

$18.50 Individuals and industrial libraries
$16.50 A.I.B.S. members and all other libraries

**(The authors of the original bibliography were Elmer D. Merrill and Egbert H. Walker, the publisher the Arnold Arboretum of Harvard University, Jamaica Plain, Massachusetts, U.S.A.)

Order from:

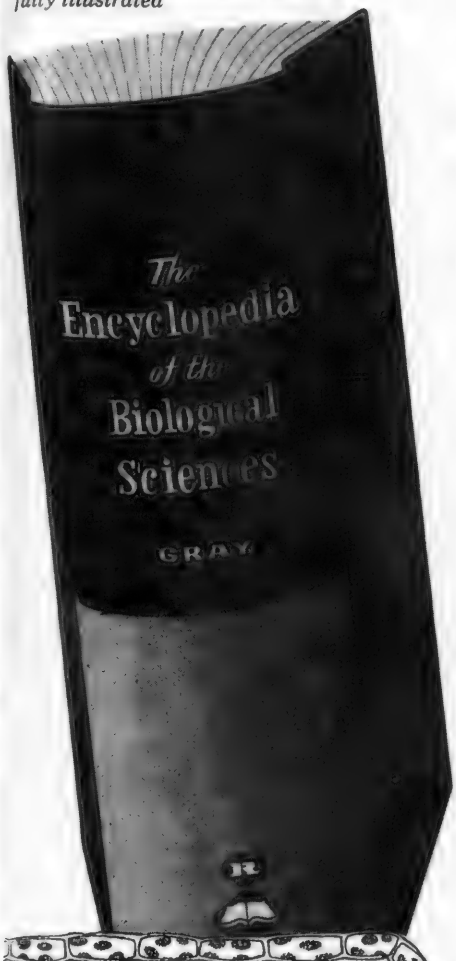
Subscriptions

AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES
2000 P Street, NW, Washington 6, D.C., U.S.A.

A Unique Achievement in One Volume

OFFERED AT A SPECIAL INTRODUCTORY PRICE

1961, 7" x 10"
over 1,200 double-column pages
fully illustrated



The Encyclopedia of the Biological Sciences

Edited by **PETER GRAY**
Head, Department of Biological Sciences, University of Pittsburgh

Special Introductory Price through April 15th, 1961: $17.50
List Price after April 15th, 1961: $20.00

ORDER NOW AND SAVE $2.50 ON THIS TRULY UNIQUE SURVEY OF THE ENTIRE FIELD OF THE BIOLOGICAL SCIENCES

If it falls between *Abiogenesis* and *Zoology*, you'll find it in the *Encyclopedia of the Biological Sciences*. Over 600 full-scale articles cover in one unique volume the broad field of biological sciences as viewed by as many international authorities in the developmental, ecological, functional, genetic, structural and taxonomic aspects. The coverage, in addition, includes numerous topics in the fields of biochemistry and biophysics.

The treatment is entirely encyclopedic – that is, all articles describe and explain their subjects as well as defining them. Except for a few biographies, they vary from 500 to 3,000 words in length, and include pertinent illustrations. Articles on such current topics as *Biological Warfare* and *Space Biology* take their place beside such classical accounts as those on *Anthropoid* and *Bacteria*.

The *Encyclopedia* provides in a condensed, yet adequate form a comprehensive account of the increasingly complex Biological Sciences. There is no other single volume on the subject that even approaches its completeness of coverage.

The *Encyclopedia* makes available to professional biologists, students of biology, teachers, laymen – in fact, anyone who needs answers to the myriad questions involved with biology – an integrated and authoritative aid to their work and interests.

About the Editor: Since 1926, Professor Peter Gray has had published over 35 papers on a variety of biological subjects, and has himself contributed to several encyclopedias. He received his doctorate in 1931 from the University of London before launching an extensive career of lecturing and research. He joined the faculty of the University of Pittsburgh in 1939, and became Head of the Department of Biological Sciences in 1947. He is a member of eleven professional societies, in addition to being an editor of *Biological Abstracts*. His determined efforts and editorial talents have contributed greatly to making *The Encyclopedia of the Biological Sciences* a significant milestone in the history of scientific literature.

Authorship Guarantees Highest Standards of Excellence

The contributors, experts from the world over – many of international reputation – strike a nice balance between up-to-the-minute presentation and classical accounts. They are drawn from more than 30 countries and the bibliographies appended to their articles cover the literature of the world.

Here is a small sampling of the articles and internationally known contributors

Actinomycetes—Selman A. Waksman, Rutgers
Anthropoid—J. S. Weiner, Oxford
Biochemical Individuality—R. J. Williams, Texas
Coniferales—P. Maheswari, Delhi
Dicotyledons—J. Hutchinson, Kew
Enzyme—Edwin C. Webb, Cambridge
Glumales—Agnes Chase, Smithsonian Institute
Hepaticae—Johannes Proskauer, California
Lateral Line—Alden B. Dawson, Harvard
Mathematical Biology—N. Rashevsky, Chicago
Origin of Life—A. I. Parin, Bach Institute, Moscow
Radiation Effects—Roberts Rugh, Columbia
Skull—Torsten Pehrson, Stockholm
Trilobita—Leif Stormer, Oslo
Xylem—William L. Stern, Smithsonian Institute

–OVER 600 ARTICLES IN ALL.

EXAMINE THIS GREAT WORK FREE!—SEND NO MONEY
Fill out the coupon below and your copy of *The Encyclopedia of the Biological Sciences* will be sent to you immediately upon publication.
Mail this coupon now to take advantage of introductory offer

REINHOLD

Publishers of the Encyclopedia of Microscopy, Encyclopedia of Spectroscopy, Encyclopedia of Chemistry

REINHOLD PUBLISHING CORPORATION, DEPT. M-754
430 Park Avenue, New York 22, N. Y.

Send me ____ copy (ies) of *The Encyclopedia of the Biological Sciences* for 10 days' Free Examination at the special introductory price of $17.50 each. (I understand that after April 15, 1961, the price is $20 each).

☐ Purchase price enclosed ☐ Bill me

Name.....

Address.....

City & Zone..... *State*.....

☐ SAVE MONEY! Check here if you enclose payment, in which case we pay all shipping costs. Same return privilege. Please add 3% sales tax on N.Y.C. orders.

Just published:

HARPER & BROTHERS
49 E. 33D ST., N. Y. 16, N. Y.

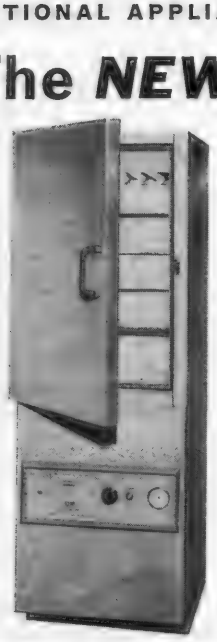
INTRODUCTORY BOTANY

by *Arthur Cronquist*

An outstandingly well-illustrated text that assumes no scientific background since it explains the necessary material from related sciences. Stressing equally the importance of facts and principles, the book traces the growth of scientific understanding through the contributions of individual biologists. Current research into 1960 is included. The angiosperms are presented at the end of the survey of the plant kingdom; this order can be reversed since all terms applicable to angiosperms are introduced as new. Over 600 drawings, photographs, and diagrams. 892 pp. $9.25

NATIONAL APPLIANCE • NATIONAL APPLIANCE • NATIONAL APPLIANCE

The *NEW* SMALL GROWTH CHAMBER



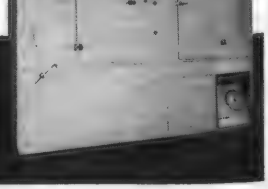
Whether you're researching 'phytochromes' or forcing germination, National Growth Chambers offer a realistic solution to your problems. Latest development is the small (64″ h 21″ w 22¾″ d), economical growth chamber designed especially for the problems requiring smaller space or more flexibility in application. Constructed with National's established high quality materials and workmanship, the small growth chamber contains complete instrumentation for control of *light, air, time, heat, cold and humidity.*

NINE DIFFERENT MODELS—*all modifiable for specific problems*

Famed for its early experimentation in growth appliances, National now offers a wide variety of growth chambers instrumented to meet the demands of your particular field of endeavor. Tested in actual use these perfected appliances offer you the greatest value in a precision tool of research.

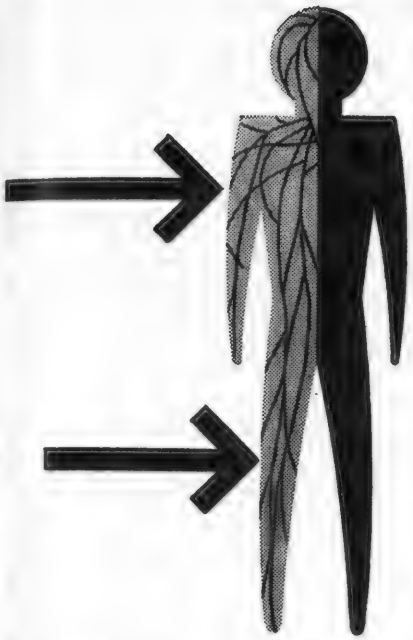
- Reach-ins
- Walk-ins
- Dual Compartment Chambers
- Small Chambers
- Aquatic Growth Chambers
- Growth Chambers, built to your specifications
- Seed Germinators

FREE: Write today for free Bulletins 5911 and 6081 containing general information, model specifications and prices.



na CONTROLLED ENVIRONMENT

NATIONAL APPLIANCE COMPANY
7634 S.W. Capitol Highway · Portland, Oregon
CHerry 6-3316



Ready in April! New 2nd Edition

Hickman INTEGRATED PRINCIPLES OF ZOOLOGY

This new 2nd edition is a major revision of an authoritative text which presents the latest concepts in the rapidly growing field of zoology and integrates them into a comprehensive picture of animal life covering comparative structure, physiology and natural history. Although it contains the most complete description of animal life science available in any general introductory textbook, the book does not assume that the student already knows a great deal; therefore, it provides an excellent foundation and basic understanding necessary to a comprehension of more advanced material in a well organized and well illustrated format. It is the only book which ties the various animal groups together by means of introductory summaries which show the biological contributions each group makes to the unfolding of the evolutionary blueprint. It explains the latest concepts in the major fields of zoology, such as evolution, genetics, animal behavior and molecular biology. No other work has an integrated treatment of the basic biological principles.

By CLEVELAND P. HICKMAN, Ph.D., Professor and Head of the Department of Zoology, DePauw University, Greencastle, Ind. Ready in April. 2nd Edition, approx. 850 pages, 6¾" x 9¾", 639 illustrations. About $7.75.

Completely revised and rewritten to give your students the most up to date and complete coverage of the subject in a book of its size

Ready Next Month! New 14th Edition

Tuttle-Schottelius

TEXTBOOK OF PHYSIOLOGY

The entirely redesigned and modernized new 14th edition of the remarkably clear, concise and popular Mosby book TEXTBOOK OF PHYSIOLOGY provides probably the most complete coverage of the subject for a book of its size. It is particularly designed as an undergraduate textbook for use in colleges and in other schools in fields allied to medicine. This edition welcomes the addition of Byron A. Schottelius, Ph.D., as co-author. Many recently developed concepts in bioelectricity, nutrition, blood pressure, muscle structure and function relating to all the systems of the human body have been incorporated in this revision.

This new edition emphasizes the interdependence of organ functions and shows your students how physiology is applied to such fields as nutrition, exercise and mental effort. To this end, the chapters on nerves and muscles are considerably expanded and more profusely illustrated than ever before. Nutrition is more thoroughly covered in this volume than in any other college book. The emphasis on the effect of exercise on blood pressure is also more extensively considered than in most other texts. Many new tables have been added, including those dealing with blood pressure, nutrition and body weight. The new concept of ideal weight is presented. Numerous old figures have been deleted; others have been redrawn and many new ones added. The text material is reorganized in a more logical sequence and reproduced in a new typographic format on a new larger page size.

By W. W. TUTTLE, Ph.D., Sc.D. Professor Emeritus of Physiology, College of Medicine, State University of Iowa, Iowa City, Iowa and BYRON A. SCHOTTELIUS, Ph.D. Associate Professor of Physiology, College of Medicine, State University of Iowa, Iowa City, Iowa. Ready next month. 14th edition, approx. 575 pages, 6¾" x 9¾", 312 text illustrations, 5 color plates. About $6.75.

Gladly Sent to Teachers for Consideration As Texts!

The C. V. Mosby Company

3207 Washington Boulevard, St. Louis 3, Missouri

For the student of first-year biology

BIOLOGY

Second Edition

RELIS B. BROWN

FLORIDA STATE UNIVERSITY,

Now an established text, *Biology* covers the entire field in beginning college biology. The text begins with a study of man, then considers the plant and animal kingdoms, and concludes with broad evolutionary and ecological concepts. The author develops a thorough understanding of concepts through his lucid, authoritative style. An extensive list of review questions are provided for each chapter, as well as general questions to promote independent thinking on the part of the students. The text is further clarified by the detailed drawings, photographs, and diagrams—many of which are in color. Here is the ideal foundation in biology to serve as a background for further work, and as an integral part of general culture. *666 pages*

Heath
COLLEGE TEXTS

To accompany the text

BIOLOGICAL INQUIRIES—

A Laboratory Guide for Biology

Not a workbook but a laboratory guide. *Biological Inquiries* directs the student in observing, dissecting, and experimenting with biological material to guide him toward an understanding of the principles involved. The manual uses the rat and the fetal pig for anatomical study of mammals, the frog in the study of vertebrates. A total of 104 line drawings illustrate the 34 exercises, the sequence of which generally corresponds to that of the text. *224 pages*

D. C. HEATH AND COMPANY

Free
catalog of high school science-teaching aids

Here is a comprehensive source for tested science materials, geared specifically to teachers' classroom and laboratory needs. 48-page illustrated catalog describes nearly 1000 items of educator-approved equipment and books ranging from astronomy to zoology—with emphasis on enrichment materials suitable for individual and group projects by students. For *free* copy, write to: Dept. M-206

SCIENCE MATERIALS CENTER
A Division of The Library of Science
59 Fourth Avenue, New York 3, N.Y.

Science Materials Center M-206
59 Fourth Ave., New York 3, N.Y.

Please send me your 48-page illustrated catalog of high school science teaching aids.

Name_____

Grade_____

Institution_____

Address_____

City_____ Zone____ State_____

WEATHER INSTRUMENTS

- Temperature
- Humidity
- Pressure
- Precipitation
- Wind

WRITE FOR CATALOG

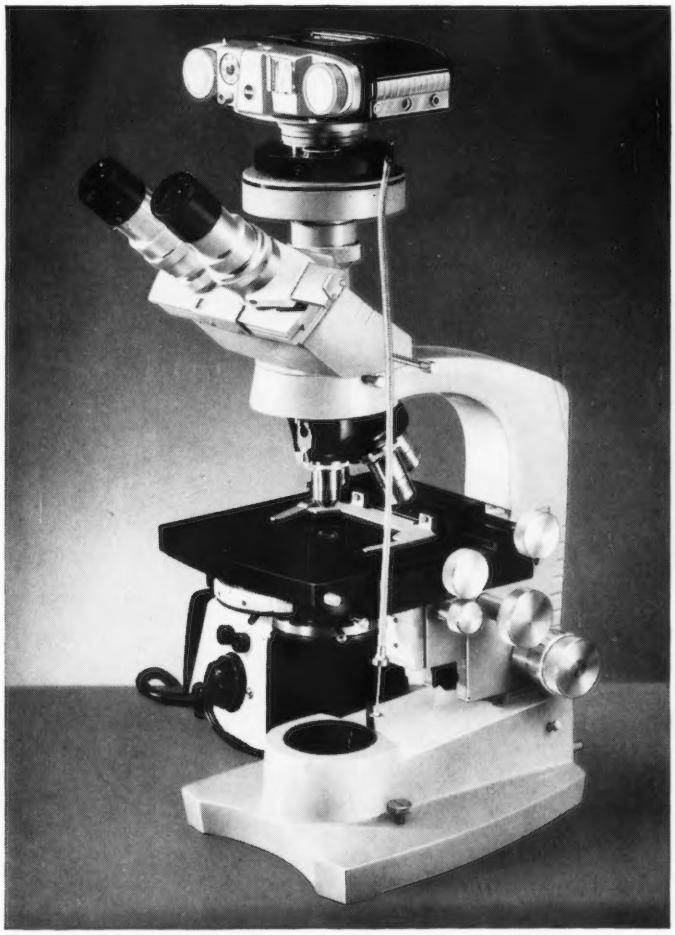
SCIENCE ASSOCIATES

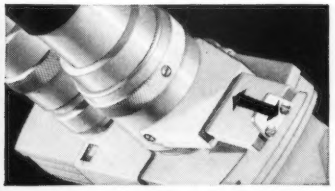
Instruments/Weather • Astronomy/Teaching Aids
194 Nassau Street P.O. Box 216 Princeton, N.J.

INDEX TO ADVERTISERS

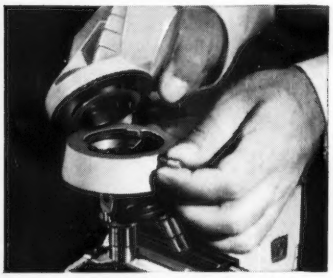
American Optical Co. ..... Cover 3
American Tobacco Co. ..... Cover 4
Appleton-Century-Crofts 34
Bellco Glass Co. 32
Biological Sciences Curriculum Study 8
Burgess Publishing Co. 8
Eberbach Corp. 34
Graf-Apsco Co. 23
Harper & Bros. 38
D. C. Heath 40
Holt, Reinhart & Winston, Inc. 32
Indiana University Press 4
Macmillan Co. 5
McGraw-Hill 3
C. V. Mosby Co. 39
National Appliance Co. 38
Prentice-Hall ..... 6 & 7
Reinhold Publishing Corp. 37
Ripon Microslides 4
Ronald Press Co. 33
Row, Peterson & Co. 31
W. B. Saunders 1
Science Associates 40
Science Material Center 40
Unitron ..... Cover 2
D. Van Nostrand Co. 10
Carl Zeiss, Inc. 9

Here's why AO Phasestar offers you more!





New Bertrand Lens Built-in Bertrand lens is now supplied as standard on all binocular and trinocular Phasestars to provide new convenience. You slide lens into position in eyepiece tube and raise or lower to focus quickly on diffraction plate at back aperture-of objective.



Interchangeable, Rotatable Bodies Your choice of interchangeable, rotatable, monocular, binocular or trinocular bodies. Simply loosen thumb screw to rotate (full 360°) or interchange. Special inclined monocular body with vertical photographic tube also available.

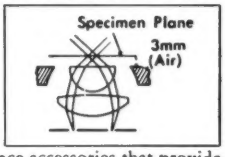
Interchangeable Stages You loosen single set screw to remove and interchange stages... your choice of graduated or ungraduated mechanical or MICRO-GLIDE stages.

The AO Spencer Phasestar is the most versatile phase microscope ever developed. Beginning with a basic Phasestar stand, you can select from a wide choice of interchangeable bodies, stages, optics and phase accessories to make up the specific model that meets your exact needs...all in all, more than 50 possible combinations or models to choose from. And whatever the model you choose, you're assured of superior AO Spencer quality *plus* matchless convenience, comfort and versatility.

Often particular phase applications require specific equipment and phase contrast objectives. Before you select your phase microscope and accessories consult your AO Sales Representative. He's qualified to help you select the microscope and equipment you need to do the job. There's no obligation, of course.

AO SPENCER PHASE ACCESSORIES FOR PLATELET COUNTS

The use of phase contrast for blood platelet counts is increasing in acceptance and application. The longer working distance required with the phase hemacytometer can be obtained with special AO Spencer long working distance accessories that provide up to 7mm working distance in air or 10½mm in glass.



AO SPENCER

American Optical Company

INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

Dept. P197

☐ I would like to review a specific phase microscopy problem. Please have AO Sales Representative call.

☐ Please send copy of Phasestar Brochure.

Name_____

Address_____

City_____ Zone____ State_____

QUALITY OF PRODUCT IS ESSENTIAL TO CONTINUING SUCCESS

Under this famous sign the pioneers of tobacco research now celebrate a

GOLDEN ANNIVERSARY

Tobacco research began in 1911. The pioneer was The American Tobacco Company. Today in Richmond, Virginia, our large, modern research center testifies to the fact that The American Tobacco Company is the leader in this field—the pioneer in a dramatic new world of tobacco research.

American Tobacco's research program now embraces every conceivable facet of the industry from growing the tobacco leaf to packaging the finished cigarette. Today great emphasis is placed on fundamental research into the nature of tobacco and tobacco smoke. Tremendous progress has been made. And as the program enters its second half century, the importance of progressive research policies is being stressed more than ever before. For research is essential to quality—and at American Tobacco, "quality of product is *essential* to continuing success."

The American Tobacco Company

FIRST IN CIGARETTE RESEARCH

©A. T. Co.